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NOVEMBER/DECEMBER 1998

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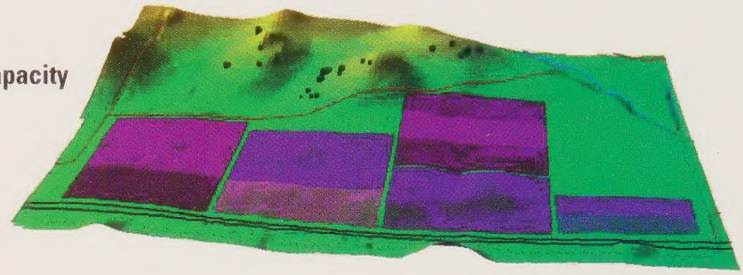

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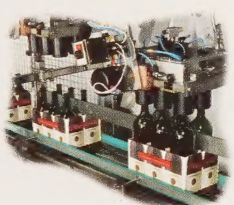

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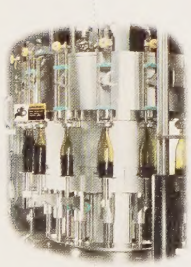

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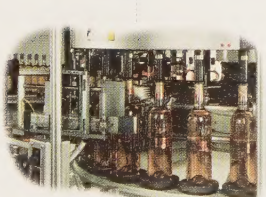

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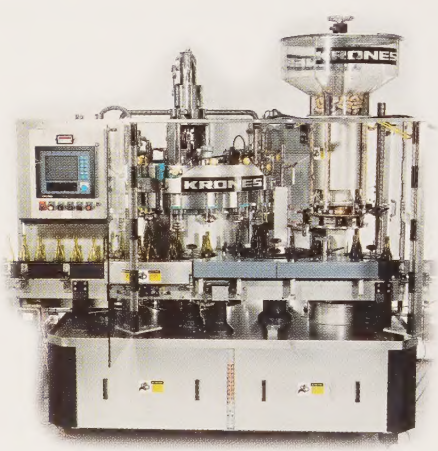

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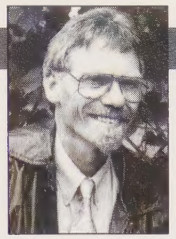

by Dr. Richard Smart

Another disease looming?

Over the last few years in California, there have been reports in the trade press about the so-called "black goo" disease, also called young vine decline. This seemingly non-technical name describes a shiny black gum which is evident in the secondary xylem (wood) of some unhealthy young vines. Lucie Morton, a vineyard consultant and author from Virginia, has been raising awareness about the condition which she has seen affecting her clients' vineyards from nursery plants to 15 years of age.

Morton's extensive research on grape rootstocks for an upcoming book indicated that the undiscovered presence of this fungal disease caused by *Phaeoacremonium* could possibly explain some of the contradictory literature reports on rootstock cultural characteristics, such as drought tolerance and influence on scion vigor.

The far-reaching economic implications of this problem have met with strong denial in a large sector of the industry. Many technical personnel have appeared reluctant to address the widespread nature and potentially enormous impact of the problem on growers.

Nurseries, naturally enough, did not want to acknowledge a problem with planting material, even though they claim use of certified material. As in the mid-1980s during the AXR-1 failure, the focus was shifted to use of uncertified or poor quality plant material, water stress, media exaggeration, and other factors. Combined with opposition to the name "black goo" was the tendency to "shoot the messenger," and the industry apparently has been divided about how to address the problem.

It seems to me that the problem described by "black goo" is serious, and that sectors of the industry should work quickly together to find out how and when this problem is being introduced into grapevines and how to control it. Wood pathogens are notoriously difficult to control once they become established in a vine.

Cooperation is important here because clues about such critical variables of climate, soil, and genotype emerge more rapidly from large amounts of data. Otherwise the wine industry will be unnecessarily set back by yet another problem that could be controlled as phylloxera is now seen to be.

International seminar

Morton organized a July 1998 study tour, seminar, and fungal isolation workshop focused on grapevine trunk diseases. I was among 70 people at the seminar at Sonoma State University (Rohnert Park, CA). The nursery industry was well-represented, although the viticultural research and extension community was not.

The first presentation was by Dr. Luigi Chiarappa, whose UC Davis doctoral thesis was on black measles. He presented the history of the esca disease, noting that symptoms and some causal organisms were described in the last century. This early research period from 1896 to 1926 saw the suggestion that two diseases — esca of Europe and black measles of California — are the same disease. The focus was then on the saprophytic fungal genera *Stereum* and *Fomes* linked to the characteristic white heart rot.

Chiarappa studied black measles from 1956 to 1960 and found the principal fungi associated with the disease to be *Phellinus igniarus* (now called *Fomitiporia punctata*) and *Cephalosporium* (now called *Phaeoacremonium),* which he considered a primary pathogen in need of further research.

Chiarappa reported that, over the last decade, research in California and Europe has identified the role of several wood-inhabiting fungi in esca and measles. The fungus *Phellinus igniarius,* a.k.a. *Fomitiporia punctata,* has been isolated from spongy rot, and *Phaeoacremonium chlamydosporum* (and several related species) from tissue with pink to brown discoloration and black streaking of the xylem. He noted that coincidentally with the latest period of esca research, Morton questioned the issue of "black goo" in rootstocks. More recently, Scheck and others from UC Davis have linked *Phaeoacremonium sp.* with black measles and young vine decline (See ***PWV***, May/June 1998, pp 32-38).

The French speaker, Dr. Phillipe Larignon from INRA in Bordeaux, described current research into the fungal species involved in esca and their wood symptoms. The likely primary invading fungus, *Phaeoacremonium chlamydosporum,* has airborne spores and may be present in the cuttings from infected vines. This points to the need to study the role of nursery operations (propagation) in the spread of the disease.

Another speaker, Mike Porter, a vineyard consultant from Forestville, CA, reported that he has had to help clients deal with unhealthy young vineyards. Porter often sees evidence of fungal invasion from nursery disbudding sites, as well as from the pith cavity at the base of the vine.

Porter finds that stem-grooved grafted vines do not grow well and should be rejected. He links the grooving to fungal growth and staining in the wood, which is easily seen when the vines are cut. He has had many unhealthy vines, not-yet-planted rootstocks, and dormant bench grafts analyzed by UC Davis and CDFA laboratories, and *Phaeoacremonium* and *Cylindrocarpon* are often found and occasionally *Fusarium, Pythium,* and even *Botriodiplodia.*

Porter believes this problem is widespread and can be traced to planting material. He associates it more often with 3309, 5C, 1103, and 420A rootstocks, but says it can be found in any rootstock genotype.

Dr. Laura Mugnai (University of Florence Institute of Plant Pathology in Italy) described how the symptoms and presence of *P. chlamydosporum* are much more widespread than previously thought. It is typically found in the brown-red wood and black streaks of esca-diseased vines, along with *P. aleophilum* in the brown necrotic areas, *Phellinus igniarius* in the white, spongy decay, and *Eutypa lata* in the brown necrosis.

P. chlamydosporum seems to be the prime colonizer of healthy wood. This was demonstrated by inoculations where *P. chlamydosporum* produced black and brown-pink wood streaks. The fungus has been shown to spread quickly in vines, over 15 inches up and down the vine in nine months in six-year-old vines.

A follow-up study of apparently healthy grafted vines (Sangiovese on 1103P) showed the presence of black streaks, especially at the grafting level. These stripes often were continuous from the basal level of the grafted vine upwards, and

P. chlamydosporum was often isolated from the base of the rootstock. It is presumed that the fungus was already present in the planting material and was either in the rootstock cuttings from the mother plants or entered the cuttings during the grafting process. Another possibility was of infection through the roots during growth in the nursery (although it has been found in vines propagated in sterile medium).

Ian Pascoe, who manages a disease diagnosis laboratory in Australia, also reported *P. chlamydosporum* in unhealthy young vines, even though esca is not thought to be widespread in Australia. Pascoe discussed sporulation at pruning wounds of infected vines, and explained that the spores are distributed via rain splashing and can drift significant distances in small water droplets. However, there are other disease agents also thought to be affecting the growth of young vines in Australia.

A likely more common problem in Australia is the phytoplasma disease grapevine yellows. In my presentation to the group, I discussed the symptoms of this disease. However, the wood staining associated with grapevine yellows is unlikely to be confused with that due to fungi mentioned above. California is one of the few regions in the world where grapevine yellows disease has not been recorded, and so my aim was to alert the audience to this problem, so that they might be on the lookout.

I also discussed the sociological and psychological aspects of how grape industries have responded to new disease threats. Parallels can be seen in how French viticulture responded to phylloxera in the late 1800s (as described in the book by George Ordish), how the Australian grape industry is presently responding to grapevine yellows, and how the California industry is responding to both phylloxera on AXR-1 and "black goo," or young vine decline.

Where to go from here?

The speakers were in agreement that it is unwise to plant *Phaeoacremonium*-infected vines, but how can it be avoided? Sometimes infected vines are evident by stem grooving, insufficient callus formation and/or poor growth, but cutting a vine in half to check for the disease symptoms renders the plant useless! There is very limited evidence that hot water treatment of nursery material may kill the disease, but the critical research on this seems not to have been done in California.

One short-term option is to plant rootstock for field grafting. This suggestion is valid where the likely source of infection is the rootstock plant, as seems to be the case in California. The xylem of each vine should be closely inspected the day that the top is cut off (allowing at least 15 minutes for the xylem symptoms to develop). Representative symptom vines should be evaluated by a pathology lab and removed as necessary.

A WINNING COMBINATION
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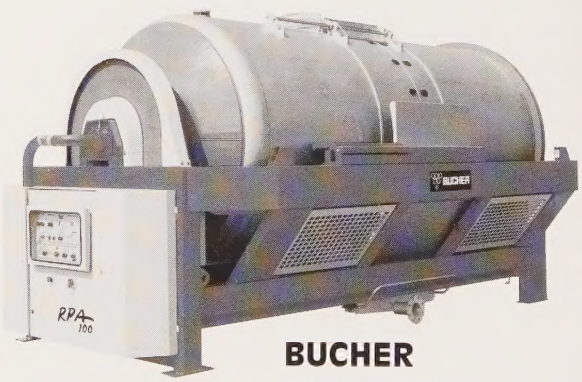

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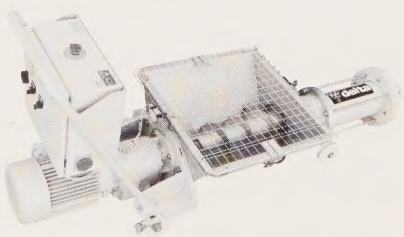

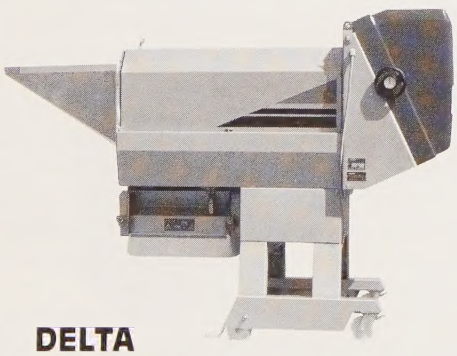

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How are the young vines becoming infected? Are the mother plants infected, as was suggested by European researchers? Is the fungus spreading during the bench grafting and callusing, as has been proposed by researchers at the University of California at Davis? (See pages 35-36 by Scheck *et al*, May/June 1998 ***PWV***.) Maybe the fungus is invading from the soil, either during planting out in the nursery or in vineyards replanted in old esca sites.

Many questions must be answered by urgently needed research, and the U.S. industry should consider whether the present research funding for this problem is sufficient to meet the present danger. In my opinion, top priority for research should be stopping any further spread. This will involve screening of rootstock-mother-vine plantings, as well as evaluation of hot water treatment for disease control.

One wonders why this disease might appear to be more evident now in California. One prospect may be that previously used rootstock mother vines of AXR were essentially uninfected, but that the so-called "alternative rootstocks" may have harbored infections which were not evident until these rootstocks became more widely planted.

Another possibility is that weak, poorly callused, stem-grooved AXR-1 and St. George vines were discarded (as should be done now), thereby culling out infected vines.

Whatever the cause, it is critically important that the disease spread be stopped. In the few days after the seminar, I witnessed widespread failure of young plantings in California, which was clearly related to the nursery stock, and "black goo" symptoms were widespread. One large new vineyard had only about 30% of the vines alive in the first year, and most of these were growing poorly!

The solution to this problem obviously lies in sanitation, beginning with the mother vines and continuing through nursery practice. I hope that soon the notion of "certified plant material" will include freedom from *Phaeoacremonium* and other harmful fungal organisms, as well as virus diseases.

Congratulations to Lucie for organizing the seminar. You have done the California industry an important service. ■

Dr. Richard Smart, "the flying vine-doctor" is an international viticultural consultant. Contact him in Australia by fax at 011-612-6584-0121, or by e-mail: vinedoctor@smartvit.com.au. Visit his home page at http://www.smartvit.com.au. He visits America frequently and can be contacted at Vinquiry in Windsor, CA, phone: 707/838-6312.

Terroir: *The Role of Geology, Climate, and Culture in the Making of French Wines*

University of California Press $50 U.S.

Available through ***Practical Winery & Vineyard*** "Bookshelf," page 68.

For more than 20 years, James E. Wilson, wine lover and geologist, studied the geology of the vineyards of France in an effort to learn how that geology affects where France's finest wines grow and why one vineyard makes superior wine while its next door neighbor does not. This book, published by the University of California Press in association with The Wine Appreciation Guild, is the summary of what he learned.

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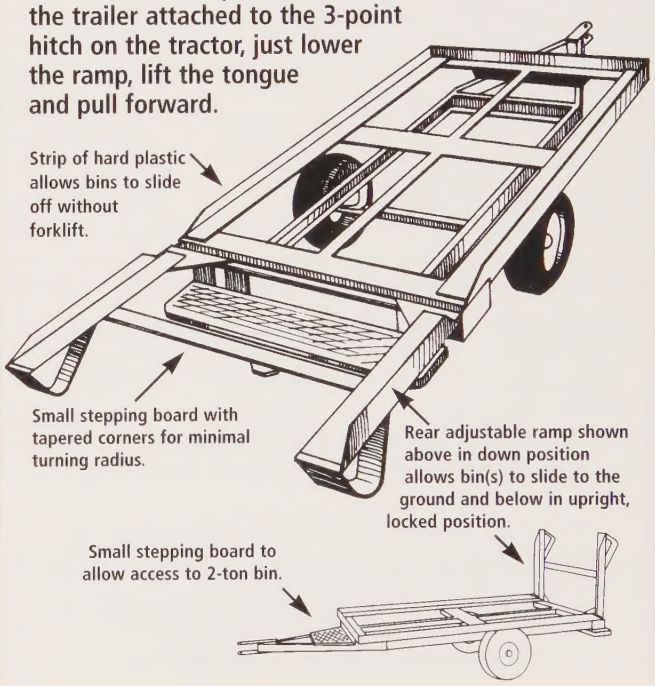
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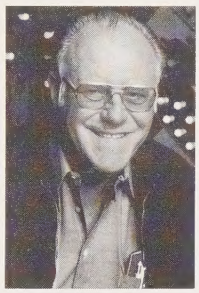
IN MEMORIAM

LOUIS P. MARTINI

The chairman of 175,000-case Louis M. Martini Winery (St. Helena, CA), died in September at the age of 79.



A major industry innovator, Martini was the first U.S. winemaker to bottle a varietal Merlot (1968/1970 blend). He was one of the first winegrape growers in the Russian River Valley, Chiles Valley, Lake County, and the Carneros region, and he identified and propagated many superior grape clones still in use. He also pioneered mechanical harvesting of north coast winegrapes.

As a vintner, Martini began using varietal designations for his wines decades before it became the industry standard and is identified as the first to use stainless steel fermentation.

Called a quiet leader by his peers, Martini was characteristically modest about all his accomplishments.

Born in Livermore, CA, Martini grew up in Kingsburg, where his father started the L.M. Martini Grape Products Co. in 1922. The family moved to Napa Valley in 1933, and his father renamed the company the Louis M. Martini Winery. Louis P. Martini graduated from UC Berkeley in 1941 and spent his senior year studying enology at UC Davis under Dr. Maynard A. Amerine.

During World War II, Martini served in the Air Force. After the war, he returned to the family winery as vice president and production manager. He became winemaker in 1954 and was named president and general manager of the winery in 1968. Martini began to reduce his role at the winery in 1978 when his son Michael took over winemaking duties. In 1985, his daughter Carolyn took over as president and chief executive officer.

Given to wearing cowboy boots and jeans, Martini was a tall, personable man who enjoyed being in the vineyards. He believed caring for the land was a vital part of his role as a vintner. "He wasn't into marketing," Carolyn explains. "Promoting wine wasn't his thing. He liked the vineyards and the winemaking end of the business."

Martini focused on producing premium wines and selling them at a reasonable price. "Giving good value was just the way he did business," says Carolyn. "He simply believed it was the right thing to do."

Martini also made significant contributions to the development of the wine industry. He was an energetic member of the Wine Institute, serving as chairman from 1977 to 1978, and was also a member and past president of the Napa Valley Vintners Association and chairman of the first Napa Valley Wine Auction in 1981. He was a charter member of the American Society of Enology & Viticulture and served as president from 1956 to 1957.

Martini is survived by his wife, Elizabeth; sons, Michael and Peter; daughters, Carolyn and Patricia; four grandchildren; and his sister. ■

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WINE INDUSTRY ECONOMIC PITFALLS

PART IV

Misunderstanding capacity

by George Schofield

Generally, the operating philosophy, not only of the wine industry but of business in general, is that an entity has to grow to prosper and succeed. This pervasive ideology incorporates significant real growth, well beyond the rate of inflation in dollars and amply above the increase in population in volume. Typically such progress is measured in market share or by some similar yardstick. The corollary is that the status quo or even constant market share equates to stagnation, lack of leadership, and reduced clout with peers, suppliers, and customers. This reasoning is one of the leading causes of the inordinate desire and pressure to expand.

Capital costs

The problem with expanding in the wine business is that expansion is so expensive. Each dollar of sales generally requires $1 of fixed assets plus $1 of inventory. This excludes vineyards, which add another $1 of assets per $1 of sales. Ratios totaling $3 of assets for each dollar of sales are not uncommon, and occasionally, as happened with Chalone Vineyards in the early 1990s, a ratio of 4:1 occurs. In business and industry when the ratio of assets to sales exceeds 1:1, the firm or industry is generally considered capital intensive. Public utilities, oil companies, and heavy manufacturing are often in the range of 1:1 to 1.5:1.

Low returns

The difficulty with 3:1 or higher ratios is that, even if every dollar of sales were converted to pre-tax profits (that is if the cost-of-goods sold and selling/administrative expenses were both at zero), the highest pre-tax return on investment possible would be the reciprocal (3:1) or 33%. With wine costs often 50% of sales and selling expenses alone another 20% of sales, pre-tax returns on investment can quickly be reduced to 10%. A typical small winery example is outlined in Table I.

This pro-forma projection assumes a winery with sales of $1 million, earnings before interest and taxes (EBIT) of $250,000 and total assets of $2 million. The annualized return on investment of such a winery would be 12.5% (before interest and income taxes). With an additional $1 million vineyard supplying most of the grapes to the winery (at a wine cost reduction of $100,000), the annualized return on investment falls slightly to 11.7%. Some wineries (and vineyards) may do better financially. Many, however, particularly in the first five years, are not able to achieve a 50% gross margin on sales or to keep selling, general, and administrative expenses under 25%. Nevertheless, the capital intensity of the industry, in combination with the inordinate pressure to grow, makes it extremely difficult to earn a decent return on investment in the wine business.

Need for capital justification

Previous articles in this series have discussed the need for higher margins and especially the advantages of growing by selling price increases as well as or instead of increasing volume alone. Recognizing that capacity — whether in the form of vineyards, wine production, or sales — is expensive and time consuming to acquire, owners ought to be cautious in planning and attempting to expand.

Certainly, capital additions should be justified by sophisticated return-on-investment analysis of incremental capital requirements and projected cash flows, with scrutiny of underlying assumptions. Often this is not done. Alternatively, capacity additions are rationalized on the general basis of meeting sales demands or satisfying contract requirements, some of which may have been recently and aggres-

Table I
Pro-Forma Projection

($000)	Winery alone	Winery and vineyard
Sales	$1,000	$1,000
Cost of wine sold	$500	$400
Gross margin	**$500**	**$600**
Selling expenses	$200	$200
General and admin. expenses	$50	$50
Earnings before interest and taxes (EBIT)	**$250**	**$350**
Investment		
Inventory	$1,000	$1,000
Fixed assets	$1,000	$1,000
Vineyard	—	$1,000
Total assets	**$2,000**	**$3,000**
Annualized return on assets		
(EBIT ÷ Total assets)	**12.5%**	**11.7%**

sively secured at low profit margins or extraordinary selling expense.

Timing of expansion

Besides financial justification, timing of investments is often critical. In addition to seasonal agricultural variations, the wine industry is also subject to national and international economic cycles and social trends. Careful review and projection of such factors may be critical in perceiving the direction and prospects of the industry, not only from an absolute level, but especially from a timing viewpoint.

Supply and demand and the related capacity factors need to be projected to the point when the investment will come "on stream" as opposed to relating them to the economics of today or yesterday. To do otherwise runs the risk of being out of sync with the market, which can result in an untimely, costly launching.

Environmental review

Directly related to financial analysis and prognosis of timing is a review of the external and internal environment of the industry. Obviously economic conditions and factors have to be reviewed as well as the social and governmental regulatory trends. Equally important is the past, current, and likely future behavior of competitors — both existing and potential new competitors. Careful analysis before capital commitment is prudent, if not essential, for success and/or survival, particularly in relation to capacity additions and predatory marketing practices.

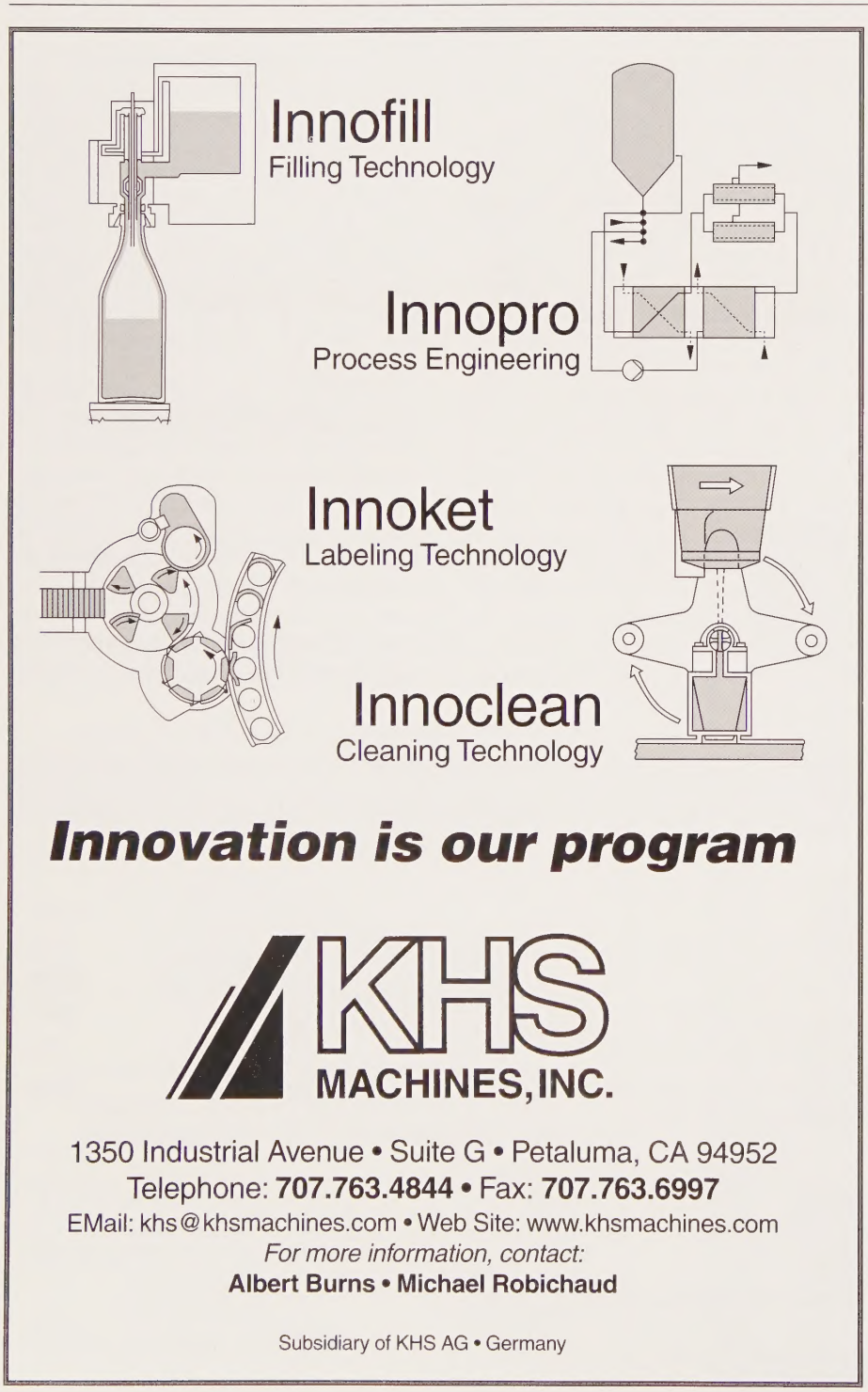
Understanding and correctly forecasting what wines will sell and at what prices is crucial. Similarly, anticipating the appropriateness of grape plantings by variety and appellation can be critical in avoiding surpluses and maximizing opportunities (*e.g.*, the overplanting of Johannesburg Riesling and the shortage of premium-appellation Merlot). Accordingly, economic research about competitive capacity decisions may be as important as financial justification of internal capital spending.

Practices of competitors

Strangely, history indicates that a few of the wine industry's largest producers have philosophically shied away from providing much of their own grapegrowing and winemaking capacity at least during certain times. Some wineries forsake the real production (crushing and fermenting) of all the wines they sell, using bulk wine market purchases as a means of minimizing their inventories and winery production capacity.

Most wineries rely on external growers under long-term contracts to provide grape requirements, some at a surprisingly high percentage of their needs. A few wineries even speculate further, relying significantly on the tendency of grapegrowers to overplant so as to facilitate advantageous "spot" market grape purchases each year.

The underlying hypothesis in this



strategy is that it has been more economical to:

1). Buy grapes than to grow grapes.

2). Buy bulk wine than make wine in their own facilities.

Implicit in this strategy for a few wineries has seemingly been to encourage growers to plant (and overplant) and to encourage vintners to build new wine production capacity. Besides the obvious effect of saving capital themselves, the adherents of this hypothesis incidentally may have contributed to increasing the magnitude and duration of the cyclical periods of grape surpluses and winery over-capacity. As long as some growers and vintners are unwilling to rationalize their capital decisions — and continue to create this over-capacity, while short-cutting prudent economic research and analysis — the risk continues that the over-capitalization mistakes of the past will be repeated.

Investment practices of wineries have varied by industry segment and geographically. In some areas these practices are beginning to change, as indicated by vineyard expansions of certain large wineries in Sonoma County and along the Central Coast of California. The key point is that, before investment or expansion, it is prudent, if not incumbent, for the investor to anticipate the plans and reactions of competitors. Large competitors are capable of — and, as history proves, inclined toward — giving upstarts an economic "boxing" lesson by exploiting the over-providing of capacity.

The common mistake, whether in assessing vineyard and winery production capacity or the market share of wine sales, is to overestimate individual share by underestimating the collective competition and new competitive entries. The result, as experienced by such stalwarts as Schlitz, Coca-Cola, Seagrams, and Brown Foreman (wine cooler), can be tragic.

Another alternative for start-up operations or small wineries is to swim with the tide rather than against it. This strategy involves creating sales first and providing production capacity gradually to satisfy realized demand. Glen Ellen Winery was essentially a "*negociant*" brand to begin with, integrating backward over time into winery capacity and vineyards. Such

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capacity additions eliminate the "market" risk, in that the demand exists, and the capacity is replacing outside contracting or "sub-contracting."

D. Sattui Winery in Napa Valley is another similar example of walking backwards into the capital requirements of the business. Starting with an old family brand and image, bulk wine was initially purchased, bottled, and sold through a great retail location in St Helena. From the success of the business, cash flow became available, over time, to build a winery and eventually buy and plant vineyards.

The cited strategy requires extremely careful timing and flexibility. The risks are encountering periods of undercapacity and/or short crops. A winery totally dependent on the spot bulk wine market for product is in a precarious position for both availability and quality of wine. However, these risks can be mitigated by mid- to long-term contractual arrangements to buy grapes, make wine, provide cooperage, and bottling/warehousing services. Considering the financial benefits of avoiding or minimizing capital commitment, the expediency of carefully entering the business in this way may justify the risks.

Conclusion

Currently, at least in some wine industry segments and geographic regions, there appears to be some semblance of a balance of supply and demand. The hope is that perhaps now common sense will prevail for a while. One possibility for growers and vintners would be to eliminate expansion on speculation by supporting capital spending with long-term contracts and/or attractive financial projections based on reasonable, well-researched assumptions.

Having a more stable financial basis will not eliminate the optimistic and romantic nature of the wine business. Rather, through due diligence in planning growth, the risky aspects of grape and wine production capacity decisions will be mitigated and thereby the investment environment and opportunities improved for everyone. The result may mean the difference between being the beneficiary or victim of capacity expansion for your vineyard or winery. ■

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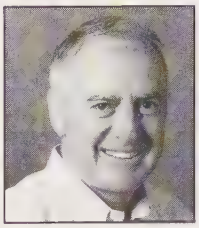
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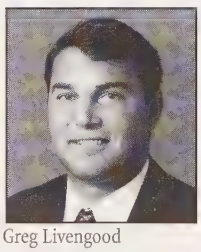
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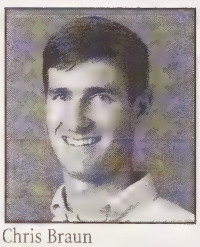
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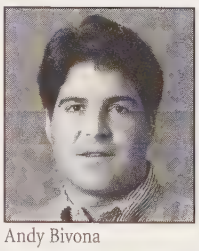
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WATER TO WINE

What are your water rights?

by Janet K. Goldsmith
Kronick, Moskovitz, Tiedemann & Girard, Sacramento, CA

When purchasing vineyard land, buying raw land for vineyard development, or lending money for either purpose, one of the first factors to be considered is water supply: Does the property have reliable water rights and an adequate supply of water?

Answering that question may not be as simple as it appears. To do so, you must consider the principal types of water rights in California and the pitfalls in evaluating water supply. In addition, in today's environment, you must also consider new ways government looks at water supply development.

Types of water rights

There are three principal types of water rights of importance to grapegrowers and vintners in California: riparian water rights, appropriative water rights, and percolating groundwater rights.

Riparian rights

Riparian water rights are an inherent part of land. They arise when the property is adjacent to naturally occurring streams or lakes. No state permit is required to divert water under a riparian right, and the amount of water that can be diverted under the right is limited only by the needs of other riparians and users of groundwater that is hydraulically connected to the stream or lake. Unlike appropriative rights, riparian rights are not lost by non-use and are generally paramount to appropriative rights.

Riparian rights are actually less useful than appropriative rights, however. The water may be used only on "riparian land;" generally land located within the watershed of the water source and part of a parcel directly adjacent to it. Except for land that was originally in a Spanish land grant, this can be a very limited area. Additionally, seasonal storage of water is not allowed under a riparian right, and many California streams are dry when irrigation is needed.

Furthermore, just because water is flowing in a stream bed adjacent to the parcel does not mean it is natural flow available for riparian use. In California, it is common for upstream reservoir operators to use natural stream channels to convey stored water to downstream customers. Such water is not "natural flow" and is not available for diversion under riparian rights. The presence of upstream reservoirs is an indication that further evaluation of the availability of natural flow is warranted.

Determining whether a parcel of property has riparian rights is complicated. It requires looking at all deeds and conveyances in the chain of title from the initial government patent to the present owner. When land is sold or otherwise conveyed and loses its adjacency to the stream, it also loses its riparian right. However, if the rights are expressly included in the deed, or if water has been and continues to be used on the severed parcel after conveyance, the rights may have been preserved. So, just because a parcel is not currently adjacent to a stream does not necessarily mean it has no riparian rights.

Conversely, just because property is adjacent to a stream does not necessarily mean it has riparian rights. If the property was ever subdivided, the later reconsolidation of the subdivided parcels would not restore any riparian rights to parcels previously severed from the stream. Furthermore, in many California land transactions, the grantor reserves some part or all of the water rights for use on retained land. This could leave a deeded parcel without riparian rights, even if it remained adjacent to the stream.

In addition, to be certain that the property's riparian rights are sufficient for the proposed use, the extent of riparian demand for the stream's water must be considered. All riparians must share proportionately in the stream's flow, and where there is a great deal of riparian demand, there may be insufficient water in the stream to meet all needs. If there is any question of adequacy of supply, a hydrologist should be retained to estimate the average and minimum flows in the stream.

Since riparian rights are not lost by non-use, a buyer or investor must consider not only the current competing

SUMMARY OF WATER RIGHTS

Riparian rights:
- No permit required;
- Are an inherent part of the land itself;
- May be used only on riparian land;
- No specific limit to amount — available supply must be shared with other riparians.
- Only natural flow of the stream;
- No storage for more than 30 days;
- Generally paramount to other types of water rights.

Appropriative rights:
- Obtained (since 1914) by application to the State Water Resources Control Board; require fees and environmental processing;
- Amount, diversion, use, and place of use all limited by permit specification;
- Allow storage of surface water for more than 30 days;
- Allow use of water on "non-riparian land;"
- Rights of priority — "first in time, first in right."

Percolating groundwater rights
- No governmental permit required;
- May be used anywhere;
- "Overlying" land has priority over "non-overlying" land;
- May be stored;
- No set restriction on amount — available supply must be shared with other overlying landowners.

riparian demand, but also the potential future riparian demand in relation to the available water supply.

Potential future riparian demand can be estimated by a hydrologist and would depend on such factors as the estimated extent of riparian land in the watershed, land use designations, climate, and water requirements of potential land uses when fully developed. All of these factors should be considered when evaluating the adequacy of water supply available under riparian rights.

While no permit or permission of the state is needed to exercise riparian rights, this also means that protection and enforcement of a riparian right is up to the riparian owner, and his/her sole remedy is to sue to enjoin invasions of the right.

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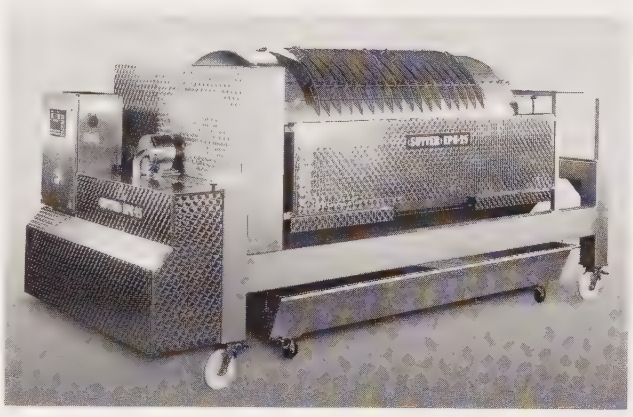

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Appropriative water rights

Water not needed for satisfaction of riparian rights is available for appropriation. For example, in the winter, when irrigation demands are low and rain is plentiful, riparian demand is diminished and streamflow is augmented. This water belongs to the state of California and is available for appropriation under its laws. Unlike riparian rights, water diverted under appropriative water rights can be stored from the wet season to the dry season, and from year to year.

Appropriative water rights are perhaps the most flexible of California water rights. An appropriative water right can be acquired (since 1914) only by application to the State. Currently, appropriative water rights are administered by the State Water Resources Control Board (SWRCB) in Sacramento.

In contrast to riparian rights, the amount of water to which the appropriative water right holder is entitled is specifically quantified and limited, as is the diversion season and rate of diversion. These are permanent fixtures of the right; if additional water is desired, a new application must be made for another permit.

Although the place of use, purpose of use, and location of the diversion are limited to those specified in the appropriative permit, they can be changed with the state's approval, through a petition process. The only qualification on the right to change the place or purpose of use or diversion location is that the change must not hurt any other water user — even a junior appropriator — or the stream environment.

Appropriative rights are rights of priority; that is, the earlier right has the higher priority. "First in time, first in right" is the maxim which governs. In times of water shortage, generally the water supply of junior (later applying) appropriators will be cut off before a senior appropriator must stop diverting.

The earliest appropriations are those initiated prior to 1914. These rights are limited to the amount continuously used since 1914, but the allowable changes may be made without the involvement of the SWRCB. The same rule — that the change not harm any other water user or the

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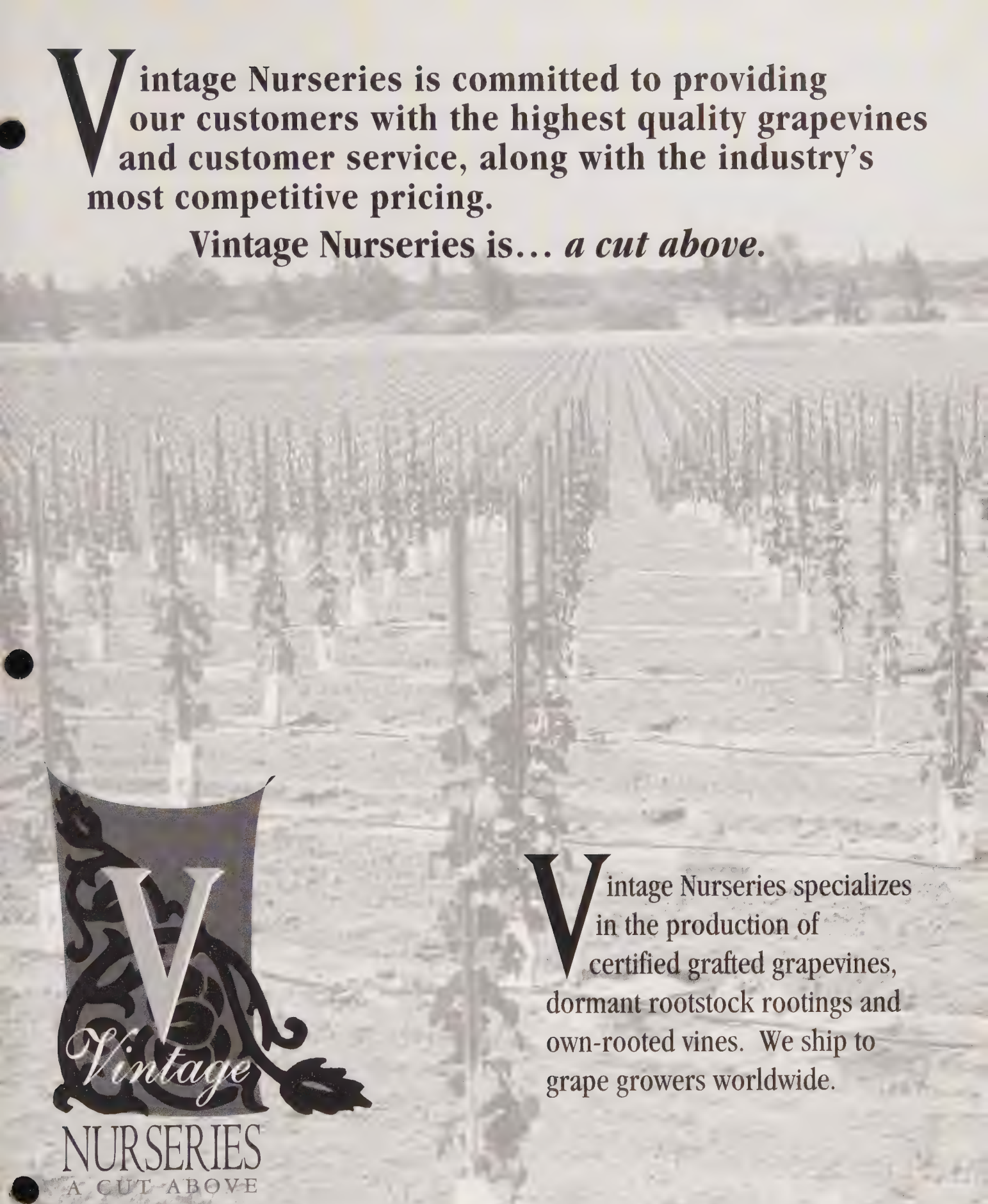

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environment — still applies, however.

Appropriative rights are quite straightforward. If you have such rights, you generally know it. The SWRCB periodically sends a form to water right holders for reporting the water use under such rights. Additionally, the SWRCB maintains maps, files, and indices, which quickly reveal whether such rights exist for specific land.

Percolating groundwater rights

Percolating groundwater rights include the right to pump water from an underground source for beneficial use. No permit is required from the state, and there are no limitations on where the water may be used. Groundwater may be stored in above-ground reservoirs for later consumption or for aesthetic, recreational, fire protection, wildlife enhancement, or other beneficial use.

There are only two limitations on the amount of groundwater that can be pumped. First, it must be used beneficially and reasonably. Second, if there is a shortage, that is, if the groundwater basin's water levels are steadily declining, the rights to use the water on land overlying the aquifer have priority over the right to export the pumped water for use on non-overlying lands.

Overlying land is that land which directly overlies the groundwater aquifer, although some also contend that any land within the watershed of a groundwater basin is "overlying land" entitled to priority. A safe rule of thumb is that, if a productive well can be drilled on land, it is overlying land.

Percolating groundwater is not within the jurisdiction of the SWRCB, and its use does not require a state permit. It may require a county well permit; but these are available as a matter of right and only enforce well construction standards. However, ever since California counties' authority to regulate was declared by the courts in 1994 (*Baldwin v. County of Tehama*), counties have become increasingly interested in regulating groundwater extractions. Ordinances enacted by such counties have, to date, been limited to regulating export of groundwater to land outside the county, however, and have not attempted to restrict local use on overlying land.

Pitfalls: When is groundwater not groundwater?

While percolating groundwater is not controlled by the SWRCB, subsurface water is under the board's jurisdiction if it is flowing in a "known and definite channel." In such instances, this underground stream is subject to the same rules and regulations which apply to surface waters.

The general rule has long been that water pumped from beneath the surface of the ground is presumed to be percolating groundwater (*Los Angeles v. Pomeroy, 1899.*) However, as water supplies become more and more stressed, reconsideration of the proper classification of underground water is occurring more and more frequently. At some future date, water pumped from wells close to a stream is quite likely to be declared subsurface flow of the stream rather than percolating groundwater.

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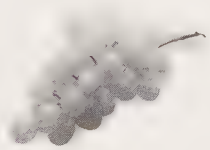

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But even water pumped from wells located much farther from a surface stream is at risk of reclassification.

The Carmel Valley in Monterey County and the Chorro Valley in San Luis Obispo County are just two examples in which underground water has been recently reclassified as subterranean streams. The essential geology of these streams is repeated up and down the California coast, where valleys are made up entirely of alluvial material deposited by a stream, which continues to run through them. The alluvium is underlain and confined by relatively impermeable bedrock which surrounds it and from which it originally eroded.

In the Carmel Valley, where the SWRCB has taken the position that wells on the valley floor are pumping from the subsurface portion of the Carmel River, proof of a valid claim of riparian right or application for an appropriative water right permit is being required.

Generally, any pumper whose lands are in an alluvial valley will not be affected by the reclassification of a valley's groundwater as a subterranean stream. Such lands are contiguous to the stream — vertically — and therefore enjoy riparian rights.

For some pumpers, indeed, the availability of a claim of riparian right will allow more extensive use than would a right to percolating groundwater. Diversions from the stream are allowed under a riparian right only if some portion of the parcel actually touches the stream. If a stream is limited to its surface flow, riparian rights are available only where the land touches that surface flow. Where the entire valley is considered part of the stream, however, riparian rights can be claimed for a hillside vineyard even if the parcel extends down the hillside only as far as the valley floor.

There are some, however, who are adversely affected by the reclassification of a valley groundwater basin as a subterranean stream. Pumpers who use valley wells to supply a non-contiguous parcel on the hillside or bench usually cannot rely on riparian rights, although their use was perfectly legal as a groundwater extraction. Additionally, if a stream has been fully adjudicated by the SWRCB or declared "fully appropriated," a pumper may be out of luck.

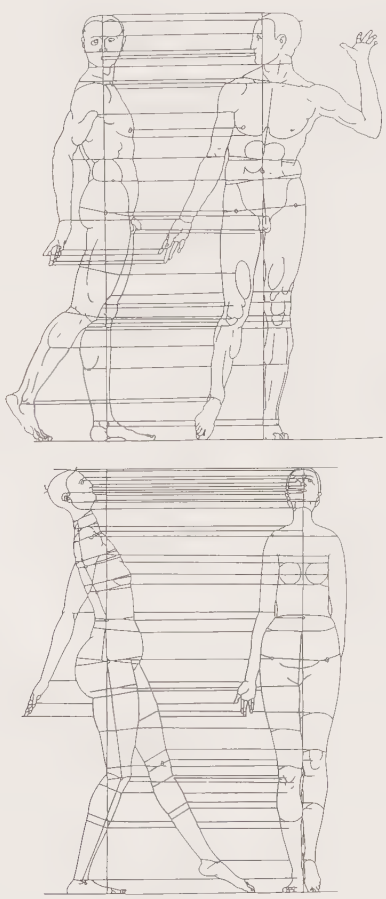
Municipal water supplies could also be adversely affected. Cities generally cannot claim riparian rights. The fact that land served by the city overlies the groundwater or touches the stream does not create a riparian right to pump.

Cities frequently rely on groundwater and consequently do not have any water-right permit to pump. Where the underground water is percolating groundwater, no such permit is necessary. If it is a subterranean stream, however, an appropriative water-right permit will be required and an application for an appropriative right would have to be filed.

If an appropriative water right is needed, it is usually prudent to apply for one as soon as possible for three reasons:

First, the SWRCB has embarked upon an active compliance program in some watersheds, and irrigators without valid

Drawings from Albrecht Dürer's *Proportionslehre*, ca. 1528



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water rights are likely to face an enforcement action of some sort.

Second, it is likely there are other pumpers in a similar situation. Since appropriative rights are rights of priority, earlier application means a better priority in cases of shortage.

Finally, if the stream is declared by the SWRCB as "fully appropriated," no further applications can be accepted, and a pumper may find himself without the ability to acquire the needed water right.

New perspective on water supply development: Springs, diffuse surface and subsurface drainage

In addition to percolating groundwater, there are other categories of water which do not fall under the jurisdiction of the SWRCB, and therefore do not require a state permit.

Springs that do not flow off the parcel of land on which they are located are owned entirely by the property owner, who may use the water as he/she sees fit. However, if the spring does flow off the property, it is considered a stream and subject to SWRCB jurisdiction, even if its waters sink into the underground before joining a stream. Many springs which are only boggy seeps in the summertime flow off their parcels during the winter, and therefore fall under the state's jurisdiction.

The SWRCB considers boreholes drilled horizontally into a spring to constitute a capture of groundwater, rather than a diversion of the spring's flow. It therefore does not assert jurisdiction over such horizontal wells.

Surface and subsurface drainage is the other category of water increasingly being turned to, particularly by vineyard developers. This is surface water before it enters or becomes a stream, and is known by various names: surface drainage, diffuse surface flow, or sheet flow. Taking advantage of these flows involves intercepting the water, collecting it, and channeling it to an offstream reservoir for later use. Subsurface drainage can also be intercepted by French drains and channeled to off-stream reservoirs for use later in the season.

In coastal areas of high rainfall, the potential yield from such practices can be considerable. Because of the lack of permitting requirements, use of these non-jurisdictional waters offers a faster and less expensive route to vineyard development.

As such practices become more common, however, it can be expected that they will be scrutinized by regulatory authorities to determine that the water being captured is truly non-jurisdictional. The site should be extensively documented by photographs and, ideally, by a botanist to create the record needed to later defend the non-jurisdictional nature of the water being developed. To be non-jurisdictional surface flow, the water must not be collected in a "watercourse," defined as any flow of water with a bed and banks, even if flow is only seasonal or associated with rain events.

Finally, such water could eventually be brought within the SWRCB jurisdiction by legislation. Although there are no current signals of any such effort, environmental opposition to vineyard development, coupled with SWRCB interest in comprehensive regulatory authority over all water of the state, could prompt revision of water right laws. Members of the wine industry and lenders should be vigilant and include jurisdictional issues related to water rights in their legislative oversight to protect their interests and investments.

Conclusion

Water supply is one of the pillars of the wine industry. Millions of dollars are invested based on the assumption that an adequate, legal water right is available to serve the vineyard land. Except in the simplest situations, it may be a wise investment to consult with a hydrologist or attorney or both to assure that the water rights being relied on are actually reliable. ■

Janet K. Goldsmith is an attorney in the Water Resources Department of Kronick, Moskovitz, Tiedemann & Girard in Sacramento, CA..

This text was edited from presentation at the 1998 Vineyard Economics Seminar presented by the Wine Industry Symposium in Napa, CA, July, 1998.

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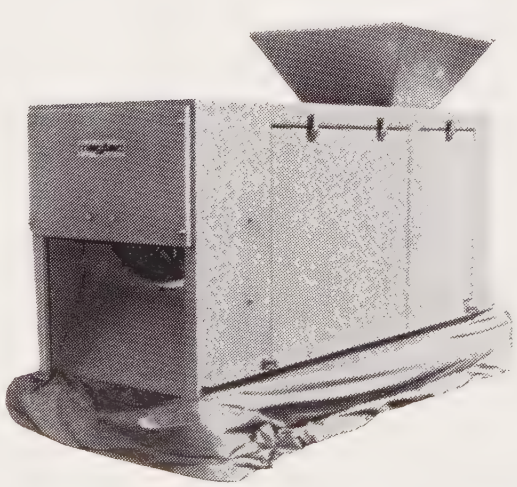

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Authoritative technical sessions add to 1999 Unified Symposium

Sacramento Convention Center, Sacramento, CA
January 20-21, 1999

It's the big picture that draws members of the wine industry to the annual Unified Wine & Grape Symposium — the newest reports, latest statistics, and evolving trends. At the 1999 symposium, the organizers have dedicated just as much attention to planning smaller, technical "how-to" sessions as the news-making general sessions.

"Our breakout sessions have always been the backbone of the Unified Wine & Grape Symposium," explains Program Chair Ed Weber. "We contact vintners, grapegrowers, suppliers, marketing people, and researchers, asking what they need to know to stay competitive. Then we search for the most qualified people to help address those questions.

In some instances, we'll spend weeks putting together a single panel, but the payoff is quality, timely information that can't be found anywhere else."

While the 1999 opening general sessions will address trends such as America's place in the global market and what consumers are demanding from the wines they drink, the breakout sessions will offer more specific information to address the interests of the broad range of symposium attendees.

Enology, viticulture, marketing, and finance make up the core of the breakout sessions, and the symposium's program committee has reached around the globe to deliver the latest information and trends.

The first subject of the general session on Wednesday, January 20, will be ***America as Part of the Global Market — Where Does the U.S. Stand as a Result of 1998 Grape and Wine Supply, Demand, and Sales?*** Speakers will be: Barry Bedwell, president, Allied Grape Growers, on the *World Wine Grape Situation*; Joe Ciatti, president, Joseph W. Ciatti Co., on *Bulk Wines Sales Around the World*; and Jon Fredrikson, president, Gomberg-Fredrikson & Associates, on *1998 Trends for U.S. Wine Sales — Demand for U.S. Wine and Imports.*

Patrick Gleeson, executive director of the American Vineyard Foundation, will then offer a research perspective on *America as Part of the Global Market,* followed by Michael Mondavi, president of Robert Mondavi Wineries, addressing *Competition and Collaboration — America as Part of the Global Market.*

On Thursday, January 21, the general session begins with: ***A Taste for America's Wine — What are Consumers Looking for and How Is the U.S. Competing as Part of a Global Wine Market?*** John Gillespie, president of the Wine Market Council, will moderate a panel of three speakers. Paul Molleman, marketing director-Europe, Wine Institute, will present ***A Realistic View from Europe with Growth in Exports and Potential for Future Sales — How Has the EU Responded to Increases in U.S. Wine Sales?***

John DeLuca, president, Wine Institute, and Bill Turrentine, president, Turrentine Wine Brokerage, will discuss: ***America as Part of the Global Market: A Shared Vision for the U.S. Industry — Developing Long-Term Wine Industry Strategies to Maintain Competitiveness.***

In addition to the general sessions, growers and vintners will have many seminars to choose from during the two-day symposium.

Impact of the Food Quality Protection Act (FQPA) on Wine Grape Production will be discussed by John Martini, president, Anthony Road Wine Company, Penn Yan, NY, and East Coast IR-4 representative; Augie Feder, agricultural policy specialist, U.S. Environmental Protection Agency (EPA), region-9; Wally Ewart, vice president for scientific affairs, Northwest Horticulture Council; and Jean-Mari Peltier, chief deputy director, California Dept. of Pesticide Regulation.

Congressional approval in August 1996 of the FQPA was a watershed for producers and users of pesticide products and people potentially exposed to pesticides. Implementation of the FQPA, the EPA's new processes to assess risk, and the potential effect on pesticide use in winegrape production will be reviewed.

The Future for Now — Quality Management in the Winery Lab will be moderated by Terry Lee, vice president of research at E&J Gallo Winery, Modesto, CA. Topics will be: increasing awareness of quality management in the laboratory and good

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reasons for investing in it, winery requirements, different lab procedures, quality assurance practices and applications, and expected costs and benefits.

On the financial side, the symposium offers a ***View from Wall Street***, where investment bankers will provide a Wall Street perspective on the growing trend toward public offerings of winery and vineyard properties, specifically on the quarterly report orientation compared to the long-term cyclical agricultural side of the business. Speakers are: James Verhey, president UCC Vineyards Group; David Goldman, managing director, Nations Bank, Montgomery Securities; Alfred Scheid, chairman of the board, Scheid Vineyards; and John Crean, vice president, J.P. Morgan & Co., San Francisco, CA.

The ***Innovations in Consumer Marketing*** session will make wine less intimidating and more fun, while keeping tasting rooms profitable, with input from Mark Chandler, executive director, Lodi-Woodbridge Winegrape Commission; Craig Root, tasting room management consultant; and Dick Wallingford, vice president of national accounts and Progressive Wine List©, Beringer Wine Estates.

How to Choose the Best Spacing and Trellising System for Your Vineyard will be discussed by Ed Weber's panel with Phil Freese, WineGrow, CA; Daniel Roberts, Kendall-Jackson Vineyards, CA; and Richard Smart, Smart Viticulture, Australia. There will be discussion on vertical shoot positioning versus divided canopy, high density planting versus wider spacing, and Scott Henry versus Smart-Dyson trellis.

International Trends in Canopy Management will be reviewed by Richard Smart — who works with grapegrowers in Europe, North and South America, South Africa, New Zealand, Australia, and Asia — providing insights for American grapegrowers.

El Niño was responsible for reduced yields and heavy disease pressure in 1998, but will its effects carry over into 1999? Dr. Larry Williams, UC Davis Dept. of Viticulture & Enology, will examine the process of ***Cluster Initiation and Development*** with El Niño in mind, asking: Was cluster initiation impaired in spring 1998, leading to reduced cluster counts in 1999? Bud dissection as a tool for predicting cluster counts and appropriate pruning strategies when fewer clusters are expected will also be reviewed.

Growers and vintners will be interested in a two-hour ***Syrah workshop,*** which includes a tasting of Syrahs, by Californians Bill Crawford of McDowell Valley Vineyard (Hopland) and Bill Easton of Domaine de la Terre Rouge (Fiddletown, Amador County), among others, with moderator, John Beuchsenstein, consultant.

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rate of return to vineyard owners) over traditional price-per-ton grape contracts will be evaluated in ***Selling Grapes Under Price per Acre Contracts.*** Panel members are: David Freed, UCC Vineyards group, moderator; Dennis Connolly, Beringer Wine Estates; Steve McIntyre, Monterey Pacific Vineyards; and Steve Dorfman, Franciscan Estates.

Update on Phenolics Management and Fining will cover the latest on absorption principles, solubility, residues, molecular weight effects, and new products. A winemaker panel of Scott Rich, Etude Wines, moderator; Glenn Andrade and Derek Holstein, Sutter Home Winery; will join Roger Boulton, UC Davis Dept. of Enology & Viticulture, to discuss how the techniques are used with results.

In ***Wine Demand in a Strong Economy***, Robert Smiley, UC Davis Graduate School of Management and Gordon Holmes, *Buyside* magazine, will explore the connection between a strong economy and the strong market for premium and super-premium wines. What can be learned from past experience with economic trends and wine sales?

A strong dollar usually produces gloomy sales numbers for agricultural products overseas and a leap in sales for imports — early indications for 1998 show strong American wine sales despite this past trend. What is behind this strong demand?

A one-hour session, ***1999 Buyer's Guide to Winery Equipment: Destemmer-Crushers and Rotary Fermentors***, is geared to anyone making purchasing decisions or operating, cleaning, or maintaining the equipment. A panel, including Christian Butzke, UC Davis Dept. of Enology & Viticulture, Robert Bertheau, Gallo Sonoma Winery, Robert Brittan, Stags' Leap Winery, Thomas Eddy, Eddy & Associates, and Walter Schug, Schug Carneros Estate Winery will consider the basic differences in technology of these items and what the subtle differences are that only an operator would know.

Demystifying Cellar Practices is for cellarmasters, enologists, assistant winemakers, and anyone responsible for cellar management. The winemaker panel of Sandy Rodgers, Simi Winery, moderator; Joe Alioto, Canandaigua Winery; Karen Ernsberger, Benziger Winery; and Pat Paris, Robert Mondavi Winery, will discuss and dispel myths about cellar sanitation practices, including how to determine if you have a problem and how to know if your procedures are working. Panelists will discuss sanitation, cooperage, filtration, and more.

Although the technical sessions throughout both days of the Unified Symposium are the signature of the show, the exhibit floor at the Sacramento Convention Center will be a multimedia resource center. Nearly 200 exhibitors will showcase the latest equipment, supplies, and technologies. Supplier presentations on the exhibit floor will offer opportunities to keep abreast of the latest industry developments. In addition, wineries from around the U.S. will pour their wines at a coast-to-coast "Taste of the Nation."

The Unified Symposium is presented by the American Society for Enology & Viticulture and the California Association of Winegrape Growers in cooperation with: California State University, Fresno; University of California, Davis; The Wine Institute; Family Winemakers; and American Vintners Association.

Request registration information for the 1999 Unified Symposium by calling 530/753-3142. ■

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1996 Zinfandel
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1996 Zinfandel, OVOC

BEAULIEU VINEYARD
Gold Medal
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1994 Georges de Latour Cabernet Sauvignon

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1995 Cabernet Sauvignon
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BENZIGER FAMILY WINERY
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1998 National Orange Show
1995 Cabernet Sauvignon
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1998 National Orange Show
1995 Reserve Merlot

CAMBRIA
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1996 Pinot Noir
Julia's Vineyard

Silver Medal
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1996 Pinot Noir
Julia's Vineyard

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Napa Valley

Silver Medal
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1994 Merlot
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1996 Cabernet Franc
Napa Valley

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1998 Riverside Int'l. Wine Competition
1996 Merlot Estate Bottled

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1998 Pacific Rim Show
1995 Cabernet Sauvignon
North Coast

Silver Medal
Eastern Guild International
1996 Merlot

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Silver Medal
1998 Los Angeles Co. Fair
Zinfandel, Ciapusci

Silver Medal
1998 Los Angeles Co. Fair
1996 Pinot Noir
Anderson Valley

ESTANCIA ESTATES
Silver Medal
1998 Orange Co. Fair
1996 Chardonnay
Monterey Reserve

Gold Medal
1998 Orange Co. Fair
1996 Chardonnay
Pinnacles

FOLIE À DEUX
Silver Medal
1998 Los Angeles Co. Fair
1996 Chardonnay

Gold Medal
1998 Orange Co. Fair
1996 Chardonnay

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1998 Clearidge Citrus Fair
1995 Barrel Select
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1998 Dallas Morning News
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1998 Merlot, Barrel Select

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1998 Pinot Noir, Reserve
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1996 Estate Chardonnay

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1996 Zinfandel, California

Gold Medal
1998 Los Angeles Co. Fair
1995 Cabernet Sauvignon

Gold Medal
1998 Los Angeles Co. Fair
1996 Merlot

KENDALL-JACKSON
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1995 Vintner's Reserve
Cabernet Sauvignon

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1998 Dallas Morning News
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1998 Los Angeles Co. Fair
1997 Vintner's Reserve
Chardonnay

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Cabernet Sauvignon

Gold Medal
1998 Los Angeles Co. Fair
1995 Syrah

STONESTREET
Gold Medal
1998 Dallas Morning News
1995 Cabernet Sauvignon
Alexander Valley

WHITEHALL LANE
Gold Medal
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1995 Reserve Cabernet Sauvignon

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PROGRESSIVE WINE LIST©

Making food wine friendly

by Eleanor & Ray Heald

Without doubt, wine drinkers in the U.S. understand varietal labeling. But when confronted with an ambitious, premium wine list in a restaurant, they can get confused about what to select and may opt not to buy wine.

To resolve this confusion and sell more wine, Tim Hanni, M.W. (Master of Wine) and director of on-premise business development for Beringer Wine Estates, proposes a Progressive Wine List© approach that is both people and food friendly.

The Beringer concept consists of two elements: a wine list sequencing program and a wine and food dynamics program, called Wine and Food in Balance.

Hanni describes the Progressive Wine List© as one that is laid out so customers can use it to find the wine style they prefer. Wines in any category (varietal or country of origin) are listed from milder to strong in taste to make the customer's selection process as easy as possible. Beringer Wine Estates offers a kit of informational brochures to help restaurants adopt the concept and encourages restaurateurs to work with distributors to reorganize their current lists.

The basic premise behind the wine and food program is that any wine can go with any dish as long as the food is in proper balance. "Balanced food allows customers to order the wine they enjoy most," explains Hanni. He proposes that chefs develop new recipes with a glass of wine in hand, asking "What effect will this dish have on the wine?" If the dish is out of balance, making the wine taste metallic, bitter, or too strong, the Beringer approach doesn't ask the chef to change the taste of the dish, but simply to adjust the acidity and salt to bring it into balance to match well with wine.

The majority of items on any menu will be in balance, but sweet or spicy foods are those most likely to be out of balance and therefore react badly with wine. Sweet and spicy flavors figure prominently in many of the world's cuisines, and Beringer Wine Estates has identified the world market as very important in its future. As a result, developing ways to help wine pair well with these flavors has been an important motivation behind the creation of the Wine and Food in Balance program.

In March 1999, for example, Hanni will take the program to China and Vietnam in conjunction with the Culinary Institute of America. He and institute staff will be working with chefs in those countries, using the Wine and Food in Balance principles, to pair Asian cuisine with California wine.

Trying it out

To explore Hanni's theories, *PWV* asked Jim Barnett, corporate chef, and Madeline Triffon, Master Sommelier and wine director, of the Unique Restaurant Corporation (URC), Bingham Farms, MI, to respond to Hanni's tenets in a round-table discussion.

URC operates 16 restaurants in southeast Michigan (in and around Detroit). The restaurants range from deli-style to casual fine dining to theme venues ranging from an all-prime steakhouse to a large seafood house. They are located in upscale malls, office buildings, and upmarket, independent hotels. All but the deli

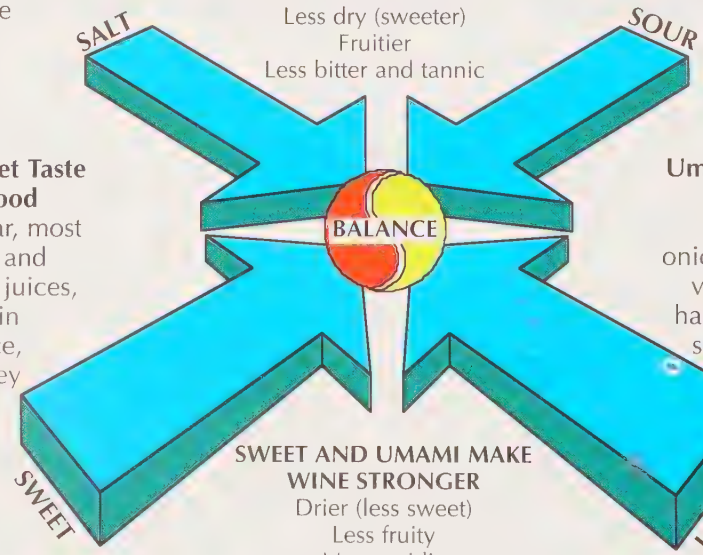
Wine and Food in Balance

Tim Hanni MW Beringer Wine Estates

Salty Taste in Food
Salt, soy sauce, fish sauce, olives, olive brine

Sour Taste in Food
Vinegar, lime, lemon, dry wine reductions

SALT AND SOUR MAKE WINE MILDER
Less dry (sweeter)
Fruitier
Less bitter and tannic



Sweet Taste in Food
Sugar, most fruit and fruit juices, hoisin sauce, honey

Umami Taste in Food
Tomatoes, onions, green vegetables, ham, bacon, sauces and stocks

SWEET AND UMAMI MAKE WINE STRONGER
Drier (less sweet)
Less fruity
More acidic
More bitter and tannic

A note about spicy seasonings . . .
Spicy food will exaggerate the tannin and bitterness of a wine. Salt and sour additions to the food will counteract this effect on the wine.

locations have a premium wine list.

URC wine lists sometimes use a progressive approach in certain categories, such as Chardonnay. "The customer response has been tremendous to arranging wines from lighter to heavier on the list," Triffon explains.

Hanni also suggests that a wine list organized on a progressive sequence is easily mastered by both restaurant service staff and the interested consumer. "Once the progressive list is understood, restaurant patrons should be able to find a wine they like." But what he proposes goes further. If food from the restaurant kitchen is prepared according to the Wine and Food in Balance principles, ***any*** dish on the menu will taste good with ***any*** wine on the list, explains Hanni.

"Virtually every dish can be balanced properly so that any wine served with it will be delicious. What this means is that the integrity and the taste of the wine itself shines through. If the wine is a Cabernet Sauvignon, it should retain its structure, character, and fruit when consumed with a dish. The same dish will retain its character and integrity with a White Zinfandel and that wine will maintain its positive elements for someone who likes the balance of the wine to begin with."

In the process of developing these food/wine balancing principles, Hanni has been working with food and sensory scientists, reevaluating basic theories. Additionally, he's analyzed the historical foundation and premises for wine and food matching and pronounces them "a horrible sham."

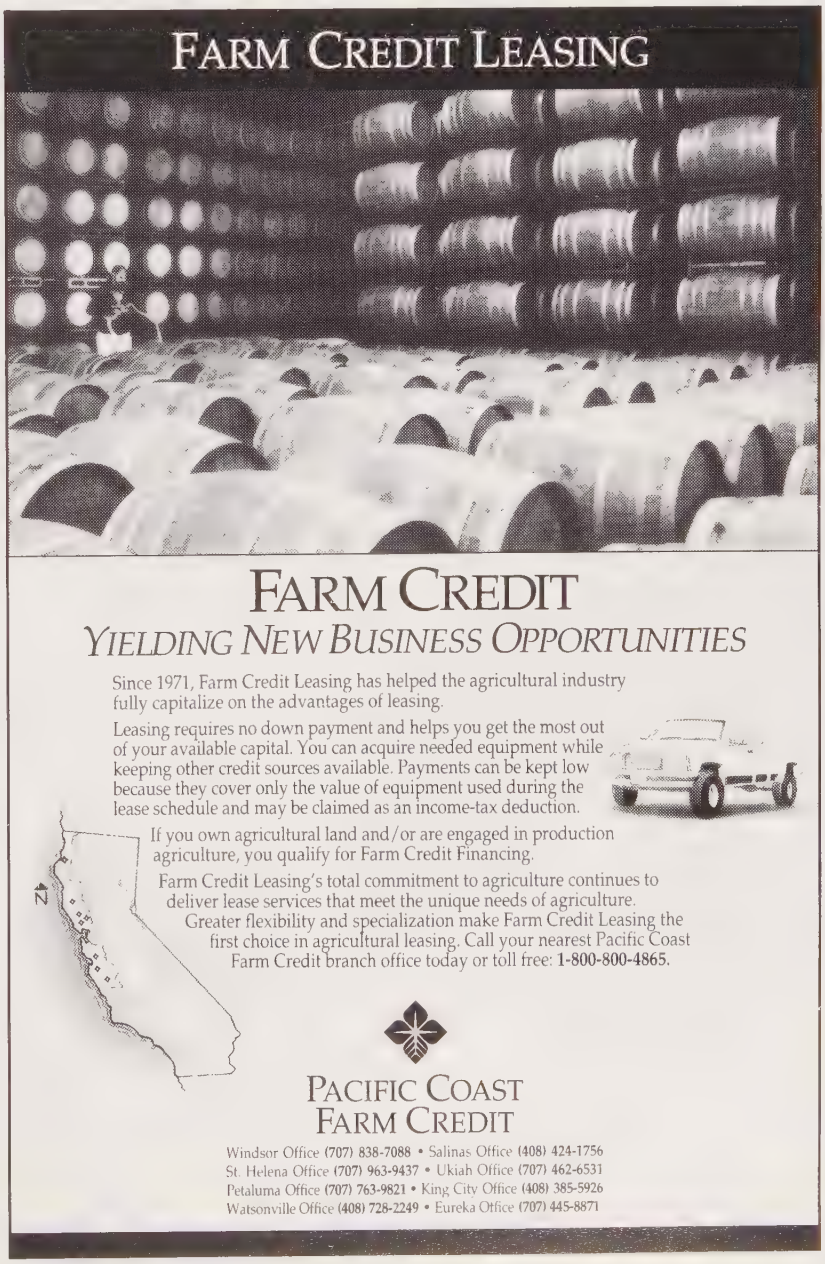
"We have created and perpetuated a fraud in wine and food history," Hanni emphasizes. "When the dynamics we're setting out at Beringer are put in practice, we are able to take a wild combination such as mango salsa with caramelized onions, abundant spice, and hot peppers and serve it with a tannic red wine and the combination is delicious. The exact same dish can be paired with whatever wine the customer will enjoy the most, once the proper balance is achieved in the food."

Taste dynamics and umami

Hanni's simple formula for good wine and food matches is based on four of the five basic taste sensations. Just as 256 million colors on a color monitor are created using only four primary colors, four taste dynamics (sweet, sour, salty, and umami) create what happens when wine and food are put together. "If we understand them, we have control over them. Without an understanding of the umami taste, this was impossible," Hanni maintains.

Umami, identified by the Japanese researcher Ikeda in 1908 as the taste in *Iaminaria Japonica* seaweed, has gained acceptance by food scientists as a fifth taste, separate from the tastes sweet, acid, salty, and bitter. *Umami* translates from Japanese as *delicious* and is associated with a savory characteristic in foods as diverse as vegetables, meats, seafoods, and condiments.

As with other tastes, umami can be hidden behind saltiness, such as soy sauce. "The umami taste of a food can affect taste elements of a wine that is served with it, bringing out bitter and metallic tastes," Hanni explains. "But the reaction between umami and wine can be negated by salty tastes in food. There are many unexplainable aspects of taste interaction between wine and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food that are directly linked with the umami taste."

Bad reactions occurring between wine and foods high in umami are most often related to bitterness. Bitterness is sometimes confused with astringency. Astringency is a tactile or "touch" element, not a taste sensation. Bitter taste is associated with green vegetables, such as arugula, radicchio, and endive. Herbs, many spices, some fruits, and foods charred during grilling are also bitter. Bitter components in food increase the bitter aspect of wines served with it. An herbal-scented Sauvignon Blanc can be pushed over the bitter edge by a dish with lots of fresh herbs, especially if the food is also high in umami, or even a little bit sweet.

Chemesthesis (stimulation associated with pungent or irritating characteristics in some foods) is also in the discussion mix and considered as a re-evaluation of hot and spicy. Heat sensed from peppers and some "hot" spices come from the effect of chemesthesis. The first sip of wine after a hot pepper may make a wine taste smooth and fruity. Once chemesthesis sensitizes the palate, the same wine will most likely taste increasingly bitter and astringent.

Taming the beast

Triffon maintains that she has been sensing the bitter, metallic element for years, but has never been able to define it when it decides to rear its head. "It's like this alien being popping up," she notes.

Umami is not always present at a threshold level, but it is the most pervasive taste in food. It makes one say "this is good." Often, when food is not "good," something with umami needs to be added.

Umami is prevalent in ham, artichokes, asparagus, sweet seafood (sea urchin, abalone, crab, scallop, shrimp, or lobster), caviar, tomatoes, and aged cheeses, for example. Oily fish, such as sardines, mackerel, and tuna, have more umami taste than lighter fish. Aged beef is preferred over fresh beef due to the higher levels of umami after the beef has been aged.

Foods high in umami taste seem to increase sensitivity to bitterness in wines and create a metallic taste in the wine. This is true with soup and sauce stocks, strong oily fish, oysters, and many dried or preserved foods including caviar. Saltiness in foods high in umami compounds reduces the bitter or metallic taste in wine.

Salt and/or acidity naturally occurring in or added to food with strong umami taste will mitigate perception of sourness and bitterness in the wine accompanying the dish and tends to lessen the reaction of umami. "Try a bite of green olive and take a sip of strong, red wine," says Hanni. "The wine will become very mild tasting due to the salt and acidity of the olive."

Two chemical compound categories are responsible for the umami taste — glutamates and ribonucleotides. Glutamic acid is an amino acid present in most foods. When glutamic acid hydrolyzes (dissolves in water), it con-

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verts into a salt of glutamic acid that is monosodium glutamate (MSG). Its natural presence in a free form in food is half the umami quotient. It hydrolyzes during the ageing process of meats and in cooking. Foods that have been salted and then cured, such as ham, bacon, gravlax, parmesan cheese or olives, are very high in umami.

Salting ham protects it microbiologically, then during the ageing process it forms the umami taste which gives it natural sweetness and savoriness. The perceived sweetness of a tomato is actually the umami taste, and it does not taste ripe until it is high in ribonucleotides. The great taste of mushrooms is umami.

"Salt makes wine mild," Hanni states. "That's the dynamic. Salt balances umami.

"What we're trying to do at Beringer Wine Estates is recreate the language used to describe wines," he continues. "We're also taking into account that we are not all genetically equipped to taste the same things, and we all have different thresholds based on all sorts of psychological influences.

"From the work we've done at Beringer, we judge that about 70% of people do not get a bad reaction between artichokes and wine. It has been said over and over that artichokes should be avoided with wine, yet a minority of people get a bad reaction. Even then, the judicious use of salt and acidity will counteract any unpleasant taste reactions for just about anyone.

"We have to get down to something simpler so the chef, sommelier, and diner can understand each other. That is, sweet and umami tastes make wine strong. Sour and salt make wine mild. Sugar is added to falsely replicate an aspect of the umami taste and creates a real problem for wine. Again, the problem can be solved by raising the acidity of the dish proportionately."

Chef's perspective

"I agree that consumers find a progressive wine list user friendly, but I have some disagreements with Hanni's concept of balancing any dish to be wine friendly," Barnett interjects. "A dish with a fair amount of sugar can be balanced with acid. Are you then contending it will complement a big Cabernet Sauvignon?"

"Yes," responds Hanni. "Try a bite of a red delicious apple and a sip of Cabernet Sauvignon. The wine becomes very strong. Put a squeeze of lemon and a bit of salt on the apple and try it again. The wine becomes mild. This is a micro version of what we do in the kitchen."

To make his point, Hanni uses the example of a Belon oyster (European flat oyster with high salinity and low umami) from Brittany, traditionally served there with high-acid Muscadet. These two are not complementary because the wine is too tart for most people and the oyster is fairly non-reactive to wine in general; the wine will still be very tart. However, serve the oyster with a mignonette of wine vinegar and shallots, and its tartness wipes out the overt acidity of the Muscadet, and the

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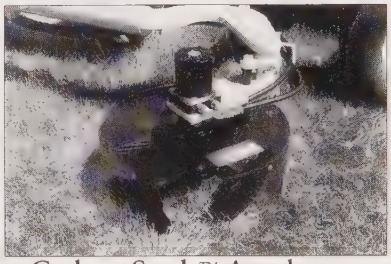

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Serve the same oyster with a mignonette and a low-acid Puligny-Montrachet, and the wine will be flat. The better choice is a Chablis, high in acidity. "This has nothing to do with the oyster or the wine," explains Hanni, "but everything to do with the mignonette. The absolute dominance of the vinegar in the mignonette lessens the perceived acidity and overt tartness of the wine."

"From my standpoint, and trying to be creative, if I don't want to serve a standard mignonette, you're saying that wine will work with the oysters as long as I introduce another form of acid," Barnett summarizes. Hanni concurs.

Hanni extends this concept further using Oregon and Washington white wines with the locally grown miyagi, kumamoto, or Olympia oysters. If one continues on the traditional operating system that pairs oysters with Chablis or a wine that tastes like it, the match will fail because these oysters are high-umami-taste Japanese varieties, and the wine will taste bitter and metallic. What this means is that lower acidity, less oak-aged wines, such as Pinot Gris, will work best, and this has been borne out by numerous comparative tastings.

Triffon takes this a step further by suggesting that balsamic vinegar can be added to a sauce to raise the acidity to make it more wine friendly. Hanni has observed that patrons at restaurants with French cooking styles are consuming regional, young, tannic Bordeaux varietals. The chef can make the wine milder by preparing a complementary sauce using salt, adding some marrow to replace lubricity, and a little lemon juice to increase the acidity.

Where older Bordeaux-style wines that may have lost some backbone are favored, Porto or Madeira added to a sauce for some measure of sweetness perks up the wine and brings back some perception of youth. If a chef uses a standard Bordelaise sauce with such an aged Bordeaux, it will kill the wine.

"How do you manage a wine high in tannin, but low in acid?" Triffon asks. "New World red wines are round, fat, juicy, and grapey with a lot of tannin. There's barely enough acid, but you need to bring the tannin perception down."

If foods are styled by a chef using all four elements — sweet, sour, salty, and umami — in balance, then Hanni suggests the best characters of the wine will shine through; the high tannins will come across smoother, and the low acid will not be problematic.

Devil's advocate

Triffon imagines herself standing at a table of diners but cannot envision asking, "Do you want your wines to taste mild or strong?" She strives to make customers comfortable when they order wines. "What people want me to do is solve their problems," she emphasizes. "They don't want to make a decision. They're asking, 'What will go best with this dish? Tell me as fast as possible, so I can get this over with.' The look on their faces says, 'Do not throw a decision at me. I'm asking you because if I could make the best choice, I would have made it already.'"

"No," Hanni responds. "Once the kitchen is employing the principles of balancing the food, the job of the server is to help the customer find the wine and food they will enjoy the most. Our latest thinking to cover this problem is to make a statement at the head of the wine list that reads, 'Our food is balanced so that wine is delicious.' This is the central theme. Then, the conversation about wine and food pairing addresses what the customer might like the best in the way of wine. We are certain of two things: first, the balancing of the food is completely feasible, and two, this is as simple as it can get."

"It's easy for wine pros to sit around and make a subject like wine and food complex," Triffon notes. "But to make things work for the server or customer at any level is what's important to me."

Hanni responds: "Let's assume that a customer states his food choices then asks which wine would go best. Our premise is to come back and ask which wines that person prefers. Whatever the choice, the server can be confident of saying, 'This will be delicious with your meal,' and really

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mean it. If the customer is convinced they should have red wine with their steak or lamb, that's great. It will be a delicious combination. On the other hand, if the customer wants a mild tasting Riesling, it will be equally delicious for them."

But Triffon has heard it before, "The person will come back at me and say, 'So, the wine needs the food to taste delicious?' Now what do I or one of my servers say? I do believe that there are good and bad combinations. If we're blind tasting wine together, 90% of the time we'd agree on quality. So, I do affirm you can say 'This is a good combination,' or 'That's bad.' If you combine heat, sweet, and tannin, it's way too strong for most consumers."

Hanni defends his premise. "We have not found a dish yet that cannot be balanced according to my principles. A wine that a person finds delicious will be delicious with the food if the kitchen preparations focus on the four taste dynamics. Balance the heat and sweetness properly and even a tannic wine will be fine. The decision-making process of a customer is going to be a balance of taste and some combination of a status attachment or cultural issues.

"Certain people are closer to the taste response and just want what tastes good to them and beyond that, they don't care. Others are working more from the emotional response or 'status' the wine represents. Either way, we are addressing the customers' needs, which is why the program is so powerful.

"No matter what drives the wine/food decision-making process (taste sensation or status), we believe the statement 'Our food is balanced so that wine is delicious' covers it. It's most important to find out what kind of wine the person likes, and if the food is balanced correctly in the kitchen, it will be delicious. The customers who 'have to have' a strong Cabernet with their lamb are encouraged to do so. But the customer who prefers a mild, white wine is respected as well.

"The truth is that if a chef hasn't balanced the four taste dynamics, the food doesn't taste as good as it potentially could. We're looking to set a new benchmark in many restaurant kitchens. This has been verified by top chefs around the world who have been using the philosophy."

Progressive wine list benefits

"Listing wines progressively allows for extremes," says Hanni. The list could include two Muscadets, for example, one very typical with high acid profile and the other modern and fruity. Where they are placed on the list communicates their difference and how they will react with food.

A progressive format organizes wines by taste profiles, advancing from mild to strong as one reads the list from top to bottom in any category. Therefore oak-aged Sauvignon Blanc with a strong taste will be listed along with fuller-bodied Chardonnays. A light, fruity Cabernet Sauvignon will be listed with similarly light wines, such as Pinot Noir and Merlot, making it easier for restaurant clientele to find the wines they will enjoy most.

A progressive list also gives waitstaff the confidence they need to make recommendations when asked. Waitstaff suggestions made to diners compare and contrast relative flavor levels of different wines depending on their placement within the list.

If a dining guest does not know whether he/she likes a mild or strong wine, the server should probably opt for milder to establish a starting point. Wines grouped from mild to strong encourage diners to experiment with new wine styles more confidently as they become familiar with the format. A wine further down the list will have stronger tastes and will most likely react more strongly with food. A diner who knows how to use a progressive wine emerges as an instant expert and is more comfortable ordering wine.

There are numerous benefits for the restaurateur with a progressive list. New wines added to a wine list are slotted in their appropriate position to make rewriting a wine list a simpler task. The balance between menu items and wines on the list is easier to understand, develop, and maintain. Finally, everyone involved with wine has a simple and useful foundation that is proven to attract consumers to enjoy wine more frequently. ■

For more information, contact Tim Hanni at Beringer Wine Estates, tel: 707/259-4623 e-mail: hannit@bwecorp.com.

COMPOST and MULCH —investing in vineyard health

by Christy Porter
California Integrated Waste Management Board, Sacramento, CA

After harvest, Will Bakx loads trucks with compost and mulch for delivery to vineyards in Sonoma and Napa counties. Bakx, a soil scientist for Sonoma Compost in Petaluma, CA, produces high-quality compost from urban yard trimmings. Many vineyard managers who apply compost and mulch after harvest are finding these products to be useful components of their vineyard floor management program.

While some vineyard managers purchase these soil amendments, others make their own compost from grape pomace. Either way, compost and mulch are products that result from recycling materials that might otherwise be wasted. As many communities collect yard trimmings at the curb to reduce organic materials going to landfills, these materials are being transformed into valuable soil amendments by producers such as Bakx. Growers and researchers alike are discovering the benefits of these recycled soil amendments.

Beneficial microbes in compost may help reduce phylloxera damage

Under the guidance of phylloxera researcher Dr. Jeffrey Granett in the UC Davis Entomology Department, Ph.D. candidate Don Lotter has been monitoring damage caused by phylloxera in organic vineyards for two years. "Indications are that vineyards using compost are doing well if they've been applying compost for at least four or five years," according to Lotter.

Lotter's research shows significantly less root rot (11.8%) in organically managed phylloxerated vineyards than on phylloxerated roots from conventionally managed vineyards (27.1%). Each of the six organic and seven conventionally farmed vineyards that were monitored have similar sand/silt/clay ratios. All of the vineyards showing favorable results are using compost in combination with winter cover crops.

Phylloxera feeding on the grape roots make the grapevine vulnerable to infection by fungal pathogens, such as *Fusarium*. However, in the organically managed vineyards, Lotter found a trend toward higher populations of beneficial microorganisms that are antagonists to *Fusarium*. These beneficial microbes include *Trichoderma* and *Pseudomonas* or Pseudomonad bacteria. (Additional information on UC Davis phylloxera research is available at http://entomology.ucdavis.edu/faculty /granett/phypage.htm.)

Compost has long been known for its wealth of microbial activity. Beneficial microbes flourish during the aerobic composting process, where oxygen is made available to the microbes either by turning the heap, thereby increasing the porosity, or by pumping air through a static pile.

There is also a relationship between phylloxera and soil type. According to the *University of California Pest Management Guidelines on Grape Phylloxera*, "Phylloxera prefers heavy, clay soils, that are commonly found in the cooler grapegrowing regions of the state such as Napa, Sonoma, Lake, Mendocino, and Monterey counties, as well as the Sacramento Delta and the foothills." Compost is a good soil amendment for improving soil structure and aeration of these heavy soils.

"Compost is an investment in the long term health of the soil and the plants," asserts Bakx.

Compost builds soils, prepares ground for cover crops

John White of Pina Vineyard Management is a strong advocate of compost. He has been using compost for a number of years and purchases it from several different Napa Valley producers. "We apply compost before planting or within the first year to improve the heavy valley soils and to build soil organic matter," says White. At an application rate of 10 tons per acre, White is applying more compost than most vineyard managers. However, the higher application rate may be necessary to help loosen heavy soils.

Fetzer Vineyards (Hopland, CA) is a subject of Lotter's phylloxera study. However, when asked why he uses compost, vineyard manager Tom Piper doesn't even mention phylloxera damage control. He cites improved soil structure, the addition of potassium, and beneficial microorganisms. In addition, Fetzer sows the seeds for its annual cover crop onto a bed of recently applied compost with good results. Unlike Pina Vineyards, Fetzer makes its own compost on-site.

"We make about 200 tons of compost every year from our pomace," explains Piper. "We turn it with a front-end loader, so we didn't need to invest in any special equipment." Compost is applied at about one ton per acre to established Fetzer vineyards and two tons per acre for new plantings.

Delicato Winery has been composting grape pomace on-site for more than 15 years. Although Delicato originally

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invested in large-scale composting equipment, such as a Scarab turner, and sold compost to other growers, the winery now only makes enough for its own use, selling the remaining pomace for animal feed.

"Grape compost makes a great soil amendment," says Bud Bradley, Delicato's director of grower relations. "It helps make the soil what I call healthy, improving drainage, and water-holding capacity." Bradley touts the widely held view that soils high in organic matter are not as attractive to nematodes. Delicato vineyards receive an average of five tons per acre of compost each year over 130 acres. Lab analysis of the compost is a standard practice at Delicato. Characteristics tested include nitrogen, phosphorus, and potassium (NPK), other soil nutrients, and heavy metals.

Compost may contribute to healthier vines and increase yields

Andrew Hoxsey of Yount Mill Vineyards is now in his third year of making compost for his organic vineyard with restricted inputs. After experimenting with commercially produced compost, he decided to try making his own custom blend. He now blends 40% pomace and 30% turkey manure with 30% composted yard trimmings from a local commercial compost producer.

Hoxsey is pleased with his blend and finds that vines that were stressed in 1995 and 1996 now appear healthier. "The primary reason we use compost is to add organic matter and boost microbiological activity," says Hoxsey. Three to four tons per acre of compost is applied over the 600 acres of Yount Mill vineyards.

Other vineyards have seen improved vine vigor and yield with compost applications. Bob Pestoni of Upper Valley Recycling (St. Helena, CA), producer of Harvest Compost, contracted with Dr. Paul Skinner of Vineyard Investigations to study the effect of his compost on vineyard yields. Skinner compared the effects of compost to a control (no applied soil amendments) in Robert Mondavi Winery's Tokolon Z block of Cabernet Sauvignon on St. George rootstock.

After three consecutive years, the

Continued on page 69

by Millie Howie

LOUIS M. MARTINI'S *Food First* kit reduces intimidation

"MOST PEOPLE, have already decided on the meal they are going to fix before they choose a wine to accompany the meal," says Carolyn Martini, president, Louis M. Martini Winery (St. Helena, CA), "but the average person often gets confused trying to determine a satisfactory pairing. We have been searching for a way to guide the public into getting the most enjoyment from the wine they choose when it accompanies foods they normally eat."

Out of that belief, the Martinis put a team together and came up with "Food First," an experiential food- and wine-tasting kit, containing the tools necessary to demonstrate how the taste of wine changes when consumed with different types of food and various methods of preparation.

"In developing Food First we considered two things," Martini explains. "First, we wanted to come up with something we could send to consumers anywhere in the world that would give them an introduction to the Martini family and Louis M. Martini wines. Second, we were looking for an idea which would help educate retailers and restaurant staffs about suitable recommendations regarding food and wine choices.

"We recognized that what's important to the restaurant is the food first. Everything else — music, chairs, table settings, general ambiance, and yes, even the wine — comes next," Martini states. "So we thought, 'How about a tasting kit, put together from the viewpoint of a chef or restaurateur?'"

Bob Matheny, vice president of sales and marketing, and Susan Garden, marketing analyst, began brainstorming ideas of what the kit should contain and what its goal should be. "My desire was for a portable tool for experimenting with food and wine pairings, that didn't call for elaborate preparation or exotic ingredients," Matheny recalls. The working title was "Wine Tour in a Box," and two caveats were "keep it simple and make it user friendly."

Matheny, aware he did not have the expertise to create the tool he had in mind, took the idea to designer David Mantel, David Mantel & Associates (San Francisco, CA), and culinary consultant and chef, Jamie Morningstar Bertoli (St. Helena, CA). Mantel's staff suggested the elements to be included in the kit and created a colorful printed fiber-board box to contain them.

Martini's Food First Kit helps educate retailers and restaurant staffs about how to make appropriate wine recommendations.

The kit includes a video and a taste matrix, laminated in plastic. Die-cut partitions in the box hold small jars of salsa and pasta sauce, a bag of dried bing cherries, and a packet of miniature tasting spoons. Collateral pieces include a wallet-size replica of the matrix, a pad of evaluation forms, a set of recipe cards, a how-to brochure, and a booklet about the Martini family and its wines. Each kit also contains a refund coupon which may be applied to purchase of two bottles of Louis M. Martini wine.

"I was always interested in helping the public learn more about the impressions various flavors and combinations of flavor have on the tastes buds," comments Bertoli, "So, when Bob came to me with the Martinis' thoughts about

Food First, I was eager to be part of the project." It was Bertoli who came up with the matrix, an extension of a food and wine compatibility guide developed by Louis P. Martini, past board chairman, some years earlier.

The matrix is a simple device to encourage consumers to break down the rigid "red wine with meat; white wine with fish" approach to food and wine by putting the emphasis on flavor. "There are no hard and fast rules; no right or wrong answers," says Martini. "We realized that, to be workable, the matrix had to be based on what people liked. It should lead the wine drinker to the answer to a question as basic as, 'I want to prepare my grandmother's recipe for macaroni and cheese. What wine goes with it?' What the kit says is, 'Exercise your taste buds.'"

The four flavor quadrants of the matrix are designed to offer simple guidelines leading to satisfying wine choices. "Because I had worked on flavor combinations for 15 years — ever since my days as chef at Inglenook Winery — it was pretty a much a task of taking my notes and putting them into a workable format," says Bertoli. Each square of the matrix describes a *flavor* — mild to strong, and a *style* of cooking — from hearty to light — with examples of dishes which fit the descriptors, along with suggested wine choices.

Bertoli prepared sample recipes, representative of the flavor styles, to be included in the kit for consumers to use in conducting their own tasting experiments. "The kit is not a one time thing," explains Garden. "You don't just do it once and toss it out. It's on-going, so the learning curve continues."

Bertoli's next charge was to look at food flavors in relation to the flavors of six popular Martini wines and come up with actual containers of food items which could be included in the kit for consumers to use as they explored various food/wine combinations. She began experimenting with marinades, but discovered that the oils in most marinades overpowered the wines.

Then Bertoli switched to things with a "discovery" response; flavors that would give the taster an immediate impression — favorable or unpleasant — after a bite of the food and a sip of the wine. She did her own formulations for the pasta wine sauce and roasted tomatillo salsa which are included in the kit.

In addition to these well-considered selections, the group looked for a way to spell out the purpose and use of the kit in easy, understandable terms. Mantel drafted a script for an eight-minute video, starting with the basic question, "What is this food and wine pairing thing anyway, and why is it important?" He felt, since this was a Martini presentation, that it was important for Carolyn Martini and her brother, winemaker

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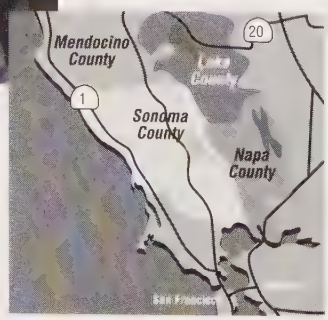

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Michael Martini, to appear in the video.

Mantel framed a series of questions, and Carolyn and Michael formulated the responses which are in the video. Bertoli's part in the video was to walk a young couple through the steps of the Food First tasting, and explain the use of the matrix. "One of my biggest fears, as we worked on this project," she admits, "was that, if we were not very careful, we would end up with something which catered only to wine snobs, and heaven knows, there are enough of them out there already." The ease with which her guinea pig couple captured the basics of the matrix in the video allayed her fears.

The Food First project began in January, 1997, and the group had a prototype kit ready in October. The first print run was 10,000 kits. The kit retails for $20. Design work was done by Kosaka Design (San Francisco, CA). The food-stuffs were formulated and packaged by California Style Gourmet (San Diego, CA). Ridge Crest Designer Services (Modesto, CA) did the printing. The elements were assembled at the winery.

Kits may be ordered by calling 800-321-WINE or by visiting the winery's website: www.louismartini.com.

The first kits were made available to members of Louis M. Martini Wine Club. "The response was enthusiastic," reports a delighted Carolyn Martini. "They wrote us letters telling us how they were using the kit — often as a theme for a party — and they started e-mailing us for more ideas."

In the fall of 1997, at the winery's annual "Heritage Lunch," the menu was built around the matrix. Four chicken entrées were prepared in four cooking styles representing each of the four flavor groups. The Heritage wines were set on the table, and attendees were invited to use the matrix to select the wine they felt complemented each dish best.

Matheny uses the kit as a tool for wait-staff training, and the committee is now developing a larger version, suitable for use with groups of up to 15 people. The winery sales staff will take the kit to restaurants to help chefs key wine to their signature dishes. When Matheny calls on the trade, he points out that the matrix is not limited to Louis M. Martini wines, it can be used successfully with any wines on a restaurant's list.

Recently, the winery has added an illustration of the Food First matrix to each technical data sheet prepared by Michael Martini for use by the sales force and mailings to the press.

"The target audience is people just like us," says Carolyn Martini, "except that they don't know much about wine. We were not aiming at the sophisticated wine drinker, but the wine drinker who was sophisticated in other ways." As she says in the video, "A long time before we thought of the phrase 'Food First,' it was a way of life with the Martini family."

See TASTE MATRIX →

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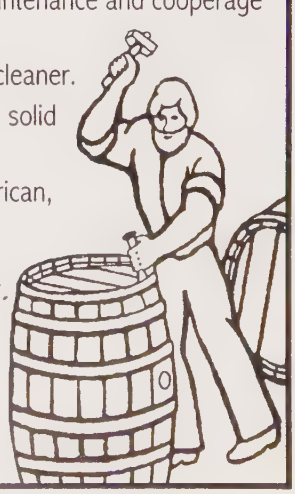

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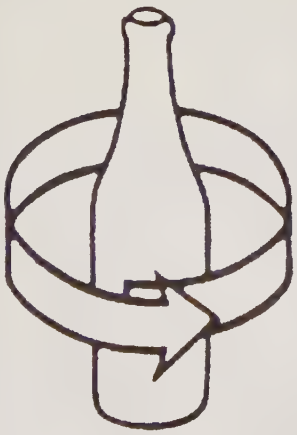

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TASTE MATRIX

This letter-sized laminated Taste Matrix card explains the Food First principles.

STRONG FLAVOR – HEARTY STYLE
FLAVORS: Bell Pepper, Oregano, Garlic
SAUCES: Tomato Sauces
EXAMPLE: ✔ Pasta w/Sausage, Bell Peppers & Oregano
PASTA
• Spaghetti w/Meatballs
• Pizza w/any Topping
MEAT
• Beef Fajitas w/Onions
• Hamburger w/the Works
POULTRY
• ✔ Chicken & Sausage Gumbo
• Bell Peppers Stuffed w/Ground Turkey, Tomato & Cheddar
SEAFOOD
• Blackened Tuna w/Cumin & Cayenne Butter
• Fishermen's Stew w/Tomatoes
MILD FLAVOR – HEARTY STYLE
FLAVORS: Mushroom, Mint, Thyme
SAUCES: Rich Brown Sauces
EXAMPLE: ✔ Beef Stew w/Red Potatoes & Carrots
MEAT
• Steak w/Mushrooms
• Roasted Leg of Lamb w/Mint
PASTA
• Risotto w/Wild Mushroom
• Lasagne w/Meat Sauce
POULTRY
• ✔ Roasted Chicken Stuffed w/Wild Rice, Thyme & Cherries
• Roasted Duck Breast w/Port sauce
SEAFOOD
• Difficult to pair
BARBERA
ZINFANDEL
CABERNET SAUVIGNON
MERLOT
WINE CHOICE
STRONG FLAVOR
MILD FLAVOR
SAUVIGNON BLANC
CHARDONNAY
SEAFOOD
• Grilled Scallop Kebabs w/Tomato, Onion & Bell Peppers
• Baked Trout w/Lime & Dill
POULTRY
• ✔ Caesar Salad w/Grilled Chicken Breast
• Roasted Chicken w/Lemon & Rosemary
SEAFOOD
• Shrimp, Avocado & Corn Salad w/Basil
• Sauteed Salmon w/Hollandaise
POULTRY
• ✔ Poached Chicken Breast w/Tarragon & Cream Sauce
• Sauteed Chicken Breast w/ Orange Butter Sauce
PASTA
• Pasta Shells w/Tomato, Zucchini & Red Pepper Flakes
• Vegetarian Lasagne
MEAT
• Grilled Pork Chops w/Tomato & Corn Salsa
• Veal Picatta w/Lemon & Capers
MEAT
• Roasted Pork Loin w/Baked Apples, Onions, & Nutmeg
• Breaded Veal Cutlet
PASTA
• Linguini w/Basil, Toasted Pinenuts & Cream
• Fettucini Alfredo w/Vegetables
FLAVORS: Citrus, Tomato, Cilantro
SAUCES: Salsas
EXAMPLE: ✔ Shrimp Salad w/Lime, Cilantro & Red Onion
FLAVORS: Apple, Tarragon, Basil
SAUCES: Cream Sauces
EXAMPLE: ✔ Sauteed Sole w/Apricots, Almonds and Cream
STRONG FLAVOR–LIGHT STYLE
MILD FLAVOR – LIGHT STYLE

✔ Recipe cards included in Food First Kit

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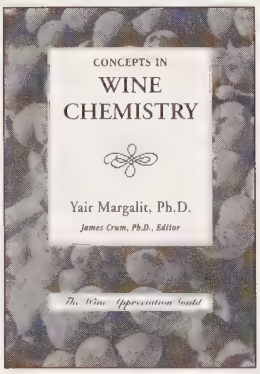

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Chambourcin & Chancellor delicious reds in the eastern U.S.

by Eleanor & Ray Heald

Winemakers in the eastern U.S. are successfully growing and making delicious red wines from Chancellor and Chambourcin grapes. Equally important, they are successfully marketing them.

European American grapes Chambourcin and Chancellor have led a controversial existence for more than 70 years. Though Chambourcin's parentage is uncertain, it is generally categorized with Chancellor as a French American hybrid (also called French hybrids or resistant cultivars). They were bred to overcome disease pressures, harsh winter climates, and to yield wines with *vinifera* character.

After the phylloxera devastation of European vineyards in the 1880s, French *viticulteurs* planted about one million acres of these and other hybrids, but in 1927, hybrid crosses between American species and *Vitis vinifera* were banned from Appellation d'Origine Contrôlée (AOC) vineyards because they threatened French viticultural traditions. Hybrid plantings continued for *vin ordinaire* until the late 1950s.

Before 1958, about 100,000 acres in France were planted to Chancellor, but the grape has essentially disappeared from French vineyards today. Some Chambourcin remains in the Muscadet area of France's Loire Valley, perhaps due to its similarity to Cabernet Franc, the Loire's pleasing red wine.

In southeastern Australia, where it is less shackled by anti-hybrid prejudice, Chambourcin is being grown experimentally.

PWV asked several eastern U.S. winemakers to discuss Chancellor and Chambourcin in this select red wine varietal review.

Wine descriptors

Cherries and a melange of red fruits are Chancellor descriptors offered by St. Julian's (MI) co-winemaker Dave Miller. Fenn Valley Vineyards (MI) owner/ winemaker Doug Welsch adds that leathery aromas and tobacco characters are apparent in cooler climates, such as Michigan, but they are site-dependent. Dave Miller suggests "Rhône-style finish" as a general descriptor for his and other Chancellors.

Where the climate is warmer and

Mark Renzaglia, winemaker
Alto Pass, IL
Chancellor/Chambourcin

Tony Kooyumjian, winemaker
Augusta, MO
Chambourcin

Eric Miller, owner/winemaker
Chadds Ford, PA
Chambourcin

Joal Wolf, winemaker
Conneaut Lake, PA
Lake Erie
Sadsbury Red (Chancellor), Finn Ditch Red (Chambourcin)

Doug Welsch, owner / **Dan McNulty,** winemaker,
Fennville, MI
Lake Michigan Shore
Chancellor/Chambourcin

Jim Doolittle, owner/winemaker
Trumansburg, NY
Finger Lakes
Chambourcin

Ted Huber, owner/winemaker
Borden, IN
Chancellor/Chambourcin

Donna Warneke, winemaker
Augusta, MO
Chancellor/Chambourcin

Dick Naylor, owner
Ted Potter, winemaker
Stewartstown, PA
Chambourcin

David Miller, Chaz Catherman, winemakers
Paw Paw, MI
Chancellor/Chambourcin

John Sotelo, winemaker
Little Compton, RI
Southeastern New England
Chancellor

Jon Held, owner
David Johnson, winemaker
Hermann, MO *Chancellor*

fruit gets riper, cherry and red fruits are quite dominant. Conneaut Cellars' (PA) winemaker Joal Wolf adds red stone fruits, in particular, to the list of descriptors.

"Chambourcin flavors depend on wine age and the oak ageing regime," says Naylor Cellars (PA) owner Dick Naylor. With limited oak, the wine has bright raspberry notes. As it ages, cherries are more prominent. When the wine has extended oak ageing, it develops tarry and leathery elements over time.

Augusta Winery's (MO) Chambourcin style is driven by blackberry and raspberry fruit, winemaker Tony Kooyumjian says. It's complexed by licorice, cigar box, and cedar qualities.

"I would describe Chambourcin as black fruit like black cherry, blackberry, blueberry, with spice and smoke," says Eric Miller of Chaddsford (PA). "It has low tannin and is at its best either in its first three years with a solid backbone of acid around 0.6 TA with 3.35 pH. It is prone to Brett infections, and I've noticed many winemakers confuse the leather, barnyard, and occasional iodine-like flavors that can develop as varietal."

Wine styles

Stone Hill's winemaker David Johnson says that Chancellor is suited to several styles. Stone Hill's Chancellor has been a light, fruity wine.

Ted Huber (Huber Winery, IN) uses Chancellor in a variety of wines including a medium-bodied dry varietal aged in American oak, a slightly sweet full-bodied red blend labeled St. John's Red, and a crisp, fruity blush wine using the free run portions drained off during *saignee* fermentation. It is Chancellor's versatility that appeals to Huber, despite its drawbacks.

Other producers, such as Fenn Valley, are striving to make a fairly structured red wine, approachable in youth but with moderate ageability.

Naylor no longer bottles a varietal Chancellor because he could not eliminate the so-called hybrid taste. "No matter what we did, it was always there in the background. Today, we use Chancellor as part of a red blend."

Welsch and Mark Renzaglia (Alto Vineyards, IL) have not encountered the hybrid taste problem.

To avoid any stigma a hybrid may carry and to promote place of origin, Sakonnet Vineyards (RI) gives its 100% varietal Chancellor a proprietary name, Rhode Island Red, which has a proven track record of being able to age up to 10 years in the bottle, reports John Sotello, winemaker.

Because Naylor believes that Chambourcin is the best red grape that can be grown east of the Rockies, he's made it in a number of styles, from Nouveau to aged two years in oak and blended with a small percentage of Cabernet Sauvignon. In the best years, he makes a Spanish Grand Reserva style aged for three years in puncheons and bottle-aged another year before release. He's also produced a Port-style Chambourcin.

"Fruit is not a dominant factor in Chambourcin," he says. "Elegance overall with a soft, lingering finish is what we shoot for in an oak-aged wine."

Augusta Winery is promoting Chambourcin as an oak-aged red comparable in style to a California Merlot. The winery also makes a Port-style wine.

With Chambourcin under proprietary name Heritage, Huber Winery strives for a full-bodied wine, moderate to high in oak perception, with a pleasant fruity character, spice notes, and lingering finish.

Viable sites

"Southwestern Michigan is the northern extreme where Chambourcin can be ripened," says Welsch. "It's the last grape we harvest because it needs the advantage of the full season. In some years, we can't get it fully ripe. Chancellor, an earlier ripener, can be grown further north."

Naylor notes that Chambourcin was introduced into New York state through Canada, but it failed to ripen in either place. "It worked its way to Ohio, where it was first reported as doing well. From there, it became popular in southern Michigan, southern Pennsylvania, and as far south as North Carolina. But in South Carolina, where it was too warm, the grape didn't color."

Maximizing sites

Welsch trellises Chancellor and Chambourcin similarly, but reports that they are "totally different in the vineyard." Chancellor is very disease prone and requires severe thinning. Chambourcin, with looser clusters, is disease resistant.

For this reason, Welsch believes that Chancellor will not continue to be grown if and when there are bans on Mancozeb and Dithane pesticides.

Welsch also notes that if Chancellor is sourced from a grower more interested in production than quality, there is little chance of making high-quality wine. "I can say this because we both grow and buy it.

"The best Chancellor is the fruit we grow because we exercise three crop controls. We prune in winter, but we cluster thin to four clusters per shoot right after bloom. Then just before veraison, we evaluate the vines, and those with light foliage may have fruit dropped.

"For Chambourcin, only a post-bloom thinning may be required," concludes Welsch.

Jim Doolittle (Frontenac Point, NY) cites that one of the most important viticultural changes that he has made for Chambourcin over the last three years is severe pruning to 20 to 30 buds per vine. Flower cluster thinning to one cluster per shoot is done when late bud break occurs to optimize ripening during a shortened growing season.

Dave Miller, who worked extensively with growers during his years in the Michigan State University (MSU) horticultural department, notes that growers are becoming increasingly aware that if Chancellor is not thinned, it does not ripen. On the plus side, Miller points out that Chancellor is more cold-hardy than Chambourcin, which damages easily in a severe winter. Chambourcin is also quite weak when grown in sandy, well-drained soils. To make up for this deficiency, Miller recommends using root stocks such as 3309 or 5BB for these sites, although more research is necessary to determine which rootstocks are best under various conditions.

Addressing challenges

Jon Held (Stone Hill, MO) admits that Chancellor has been removed from Stone Hill's vineyards. "Chancellor has so many negatives stacked against it. It is susceptible to every disease in Missouri and extremely prone to Crown Gall. We continually replaced trunks."

Dave Miller noted that Chancellor

grown on sandy soils is less susceptible to Crown Gall, and Welsch agrees, "Chancellor is extremely soil-sensitive and when grown in heavier soils, Crown Gall is inevitable."

Donna Warneke reports that Montelle Winery (MO) has lost Chancellor in two vineyards due to Crown Gall.

In addition, Held says, "Chancellor is susceptible to aerial phylloxera. In a humid year, we have so much aerial phylloxera and suffer so much leaf loss that we have a hard time ripening fruit. The only effective control for aerial phylloxera is Thiodan, and this chemical severely burns Chancellor leaves. Essentially, we can't use it.

"With the fluctuating winter temperatures experienced in Missouri, it is like a roller coaster ride. In a warm February, Chancellor can have secondary and tertiary buds pushing in addition to primary. This can be followed by a blizzard or snow storm with temperatures dropping into the teens for a week. We'll lose an entire crop. On average, every three years, we suffered crop loss due to early bud break."

Naylor notes that this has never happened in his vineyards, located in southern Pennsylvania. "We've had sap move up but never severe early bud swell."

But Renzaglia says Alto Vineyards' climate in Ilinois is similar to Missouri's. "We do have extreme temperature fluctuations in winter, but some of our Chancellor is doing well, and we'll keep growing it as long as we can. However, we are looking to Chambourcin as the premium red."

Welsch mentions that in August, Chambourcin at Fenn Valley develops what is assumed to be oxidative stipple on the leaves (not due to leaf hoppers). This causes bronzing and reduction of photosynthetic ability.

Naylor says he has had the problem in drought years, but as vineyards matured, it has diminished. "We assume that this is because Chambourcin sinks its roots very slowly."

Welsch counters that his vines develop the stipple in both wet and dry years and that it does not seem to be age-dependent.

Dave Miller says the condition is one peculiar to Chambourcin. So far, he has been unable to identify the problem.

Crop yields and sugars

Naylor says Chambourcin yields should be kept to 2 to 2.5 tons/acre (TPA). Chancellor can go to 3 to 3.5 TPA.

Kooyumjian reports 4 to 5 TPA for Chambourcin. "We have no problem with Chambourcin at high crop loads," he contends. "There's no effect on fruit quality. Our one problem is late ripening about the third or fourth week in September. By then, it can be quite cool and hitting a good acid/sugar balance is just about impossible."

Warneke cites Chambourcin crop yields as high as 9 TPA. She maintains that the winery has controlled levels to as low as 3 TPA to improve color, but without success. Coloration remains problematic at Montelle.

Sustained low temperatures can

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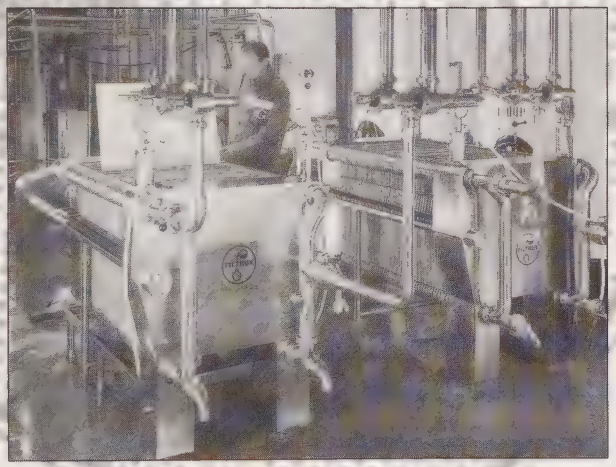

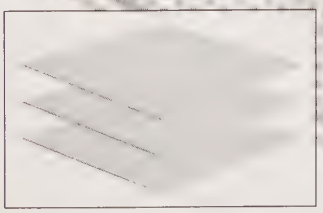

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severely damage Chambourcin and restrict crop load. "In late January 1994, at MSU's southwest research station, lows of -17°F were recorded, and Chambourcin sustained considerable damage," Dave Miller reports. "But we still got a crop of 2 to 2.5 TPA where normal is 4 to 5 TPA. "Since this experience, we replaced all Chambourcin trunks and retain a sucker at the soil level to renew trunks when necessary."

Generally, at harvest, Chancellor has lower sugars than Chambourcin. "We need to stop believing that Brix is an indication of ripeness," Welsch proposes. "If I had to characterize it, we don't get Chambourcin as ripe as Chancellor, yet sugars are higher."

Kooyumjian says Chambourcin does not achieve high sugar levels in Missouri. Maximum is 21° Brix with 19° Brix most typical. Sugar/acid balance is good and Augusta Chambourcins generally have medium to medium-heavy body with excellent color.

In the cellar

Welsch explains that the two varietals, both machine harvested, are handled somewhat differently in Fenn Valley's cellar.

Several practices, however, are similar. Must is inoculated with cultured yeast, followed by ML culture inoculation at 10° to 15° Brix. Once fermentation starts, the cap is punched down two to three times daily.

About 65% of Chancellor is crushed. The remainder is fermented as whole berries. Pressing is done at dryness after a seven to 10-day fermentation.

For Chambourcin, half the berries are crushed, and a method of late carbonic maceration is employed. After 10 days, fermentation begins to slow, and when the head space is gassed with CO_2, the fermentors are sealed. Pressing is done after an additional 30 days.

For both varieties, chaptalization is done prior to fermentation, as needed. It's based on an estimate of potential juice yields.

Doolittle also prefers extended maceration (28 to 34 days) for Chambourcin, but he does not consider it a form of late carbonic maceration since only 10% of the berries remain uncrushed. It is aged for two years in American oak barrels to permit black cherry and raspberry character to develop.

At Huber Winery, grapes are crushed and destemmed, but 20% to 30% of the free run juice is immediately drained off. The remaining must is inoculated and ferments in seven to ten days before pressing. "The initial juice fraction drained off is used to add color and increase acidity in our blush wine," reports Huber. "The juice is also used to enhance color and aroma for our blended *Generations* dry red. This process helps us to overcome both varietal and *terroir* factors that tend to inhibit color, aroma, and tannin extraction. By paying close attention to both pH and TA levels, the resulting Chambourcin and Chancellor wines can be both well-balanced and full-bodied."

Eric Miller (Chaddsford) makes two Chambourcin wines, Seven Valleys and Proprietor's Reserve Red. For the Reserve, one-third is whole berries, crushed 80%, which peak at 85°F during primary fermentation and remain on the skins for 14 days at or below 65°F and then pressed. One-third is thermally vinified without skins. One-third is destemmed, 80% unbroken berries which peak at 85°F during primary fermentation, then cooled to 65°F and pressed off the skins between 5° and 8° Brix. The three lots are assembled and finished with toasted U.S. oak chips at 50 lbs per 1,000-gal.

Kooyumjian utilizes a fairly short skin contact time in Chambourcin production. Wine is pressed at 1° to 2° Brix after about seven days. He prefers to focus more on fruit flavors than Chambourcin's limited tannins.

Joal Wolf (Conneaut Cellars) crushes 20% of the fruit (leaving 80% whole berries) and ferments Chambourcin and Chancellor separately in one-ton bins. Grapes are stomped by winemaker's feet in rubber boots until fermentation starts, then the cap is punched down by

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hand three times each day. Pressing is at 1°Brix after about seven to ten days. Chambourcin (Finn Ditch Red) is aged for 12 months in three-year-old American oak barrels. Chancellor (Sadsbury Red) is aged for six months in four-year-old American oak barrels, previously used for Chambourcin.

"We aim for a cigar-box characteristic with moderate tannins and fruit flavors for the Chambourcin, while the Chancellor has light tannin and intense fruit flavors," says Wolf.

Welsch's experience leads him to say that Chancellor is less tannic and softer. Blended with Chancellor (about 75%), Chambourcin (about 25%) is a source of tannins but, "we're not talking tannic by California standards," he notes.

Huber also blends 30% Chancellor with 70% Chambourcin into a medium bodied *Generations* blend aged in first and second fill oak.

On some sites, Chancellor respires acid quickly and requires correcting for high pH before bottling. Welsch admits to a pH problem with Chancellor. He does not know why, but speculates that there may be some buffering occurring in the pigments.

At Fenn Valley, correction for high pH is done at cold stabilization. The wine is chilled and seeded with cream of tartar, followed by an acidity check. Acid addition trials are conducted, and tartaric acid is added while the wine is cold.

"We play this game every year," Welsch admits. "We ask how much can we acidulate to drop the pH from 3.9 to 3.5 or 3.55 without making the wine puckery? As a Chancellor cellar management problem, pH is number one."

Renzaglia has similar problems with both Chancellor and Chambourcin.

Oak regimes

Kooyumjian has never had good luck with oak chips. Oak flavor is added as a singular note, but chips do not add any element of complexity. He has not observed a big difference between French and American oak in overall impact on the wine. As a result, he chooses less expensive American oak for 18 to 24 months.

American oak barrels are used exclusively at Fenn Valley. They are "stripped out" first by white wines. A blend of both American and French oak chips is also used.

"Chancellor takes well to oak, but Chambourcin's high fruit composition, both in aroma and flavor, makes it susceptible to over-oaking," Welsch notes.

Naylor ages Chambourcin for two years in a combination of older French and American oak. This is also the choice of Sakonnet's John Sotelo in choosing a combination of two to three-year-old American (75% of total) and French cooperage for up to 18 months barrel ageing, depending on the vintage.

Both Chancellor and Chambourcin have given winemakers in the eastern U.S. viable and competitive wines to satisfy growing demand in the current red wine boom. ■

PWV thanks the Held family, owners of Stone Hill Winery, Hermann, MO, for hosting the varietal review discussion/tasting.

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How GIS can help vineyard development

by Jamie Carothers,
VESTRA Resources, Inc.

Hess Collection Winery (Napa, CA) is implementing an in-house geographic information system. The system will give Richard Camera, director of vineyard operations, a geographic basis for organizing, displaying, and evaluating all of the information available about his vineyards, including soil type, irrigation layout, rootstocks, yields, and more from outside consultants, surveyors, and engineers.

The information will be organized into spatial databases, and the winery will manage and update the information in-house. The Hess Collection is using a number of modern technologies, with a geographic information system (GIS) as the centerpiece.

Camera expects to use the system to help him manage development of two large new vineyards and several small ones. These projects will add 450 acres to the winery's 750 planted acres in California. "I have been looking for a program which would allow me to organize the large amount of data involved in the decision-making process," says Camera.

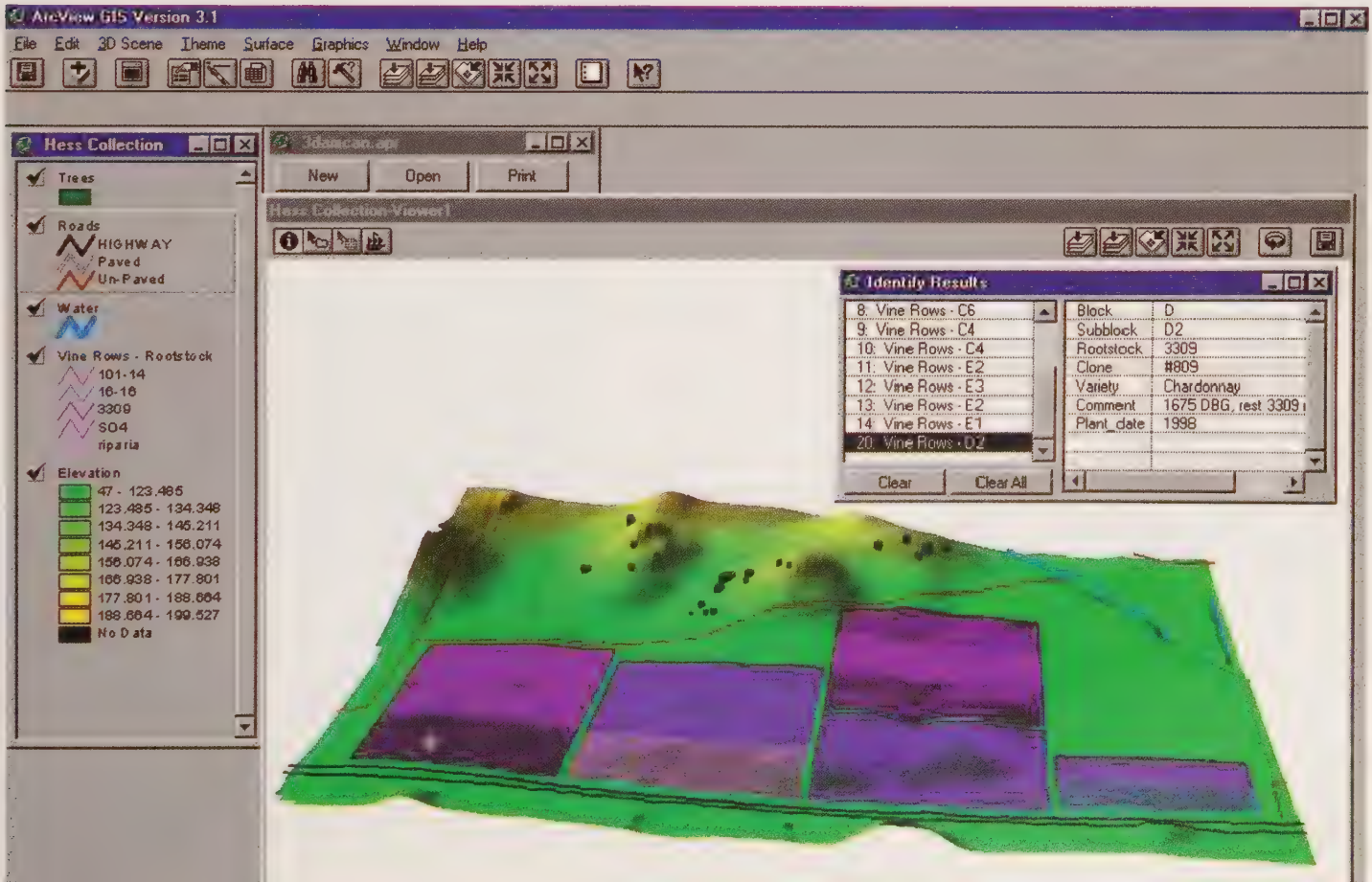
"My university degree was in geography, and with it I developed a fondness for maps. This has always had an influence on my view of the world and on my management style." One look around his office yields an appreciation for the importance of maps in managing Hess Collection vineyards, both existing and developing. Camera's predilection for maps coupled with The Hess Collection's philosophy of being innovative and in front of the pack combined to produce strong support for the GIS project.

What is GIS?

Environmental Systems Research Institute, Inc. (ESRI), a world leader in the field of GIS software, offers this formal definition of a geographic information system:

An organized collection of computer hardware, software, geographic data, and personnel designed to efficiently

A 3-D view of The Hess Collection's American Canyon vineyard development, using GIS software. Purple blocks identify rootstock. The "Identify Results" box shows the database attached to vine rows (blocks, subblock, rootstock, etc.).



capture, store, update, manipulate, analyze, and display geographically referenced information.

While accurate, comprehensive, and widely accepted, this definition does not help the newcomer to GIS a great deal. Perhaps the following definition from ESRI offers more: A GIS is a computer-based tool for mapping and analyzing things that exist and events that happen on earth, using common database operations such as query (asking questions of data) and statistical analysis, with the unique visualization and geographic analysis benefits offered by maps.

Another way to explain GIS is by analogy: consider several patchwork quilts spread upon a bed. Each quilt represents a different layer of information (*e.g.*, yield, wine quality, rainfall, soil, chemistry, rootstock, clonal selection, rows, block boundaries, irrigation, *etc.*), and each patch represents a different area within that layer. The bed represents the geographic extent of the entire project.

In addition to the spatial data — the shape of each patch and its location in the quilt — there exists descriptive or attribute data — the stuffing inside the quilt — describing the attributes associated with each patch. The more layers of patches overlaid one upon the other and the more detailed the attributes within each layer, the more richly detailed the information "quilt."

The GIS is not simply a computer system for making thematic maps of various locations at different scales with attractive colors (although it does this quite well); rather, the major advantage of the GIS is that it allows complex and detailed analysis of the spatial relationships between map features and their descriptive data.

As intelligent humans, we can only effectively track three or four layers of information overlay before record keeping becomes a nightmare. Here is where modern computer hardware and GIS software become useful. GIS software is the organizational tool, allowing today's super-fast computers to handle the numerous (and sometimes quite extensive) layers with ease. The software tools Camera and others at Hess Collection are using include ArcView® with the Spatial Analyst® extension (by ESRI) and VESTRA AgPlan® (by VESTRA Resources, Inc.).

GIS introduction at Hess Collection

Don Gordon, a Senior GIS Analyst with VESTRA Resources, Inc., initially presented the capabilities of the ESRI and VESTRA software products to Camera. In addition to Gordon's demonstrations, Camera explains, "The free GIS software that is available from ESRI's website was very instrumental in convincing me that [GIS] would be of great value to us as a company." The freeware to which he refers is ArcExplorer, available from ESRI's website (http:www.esri.com/arcexplorer).

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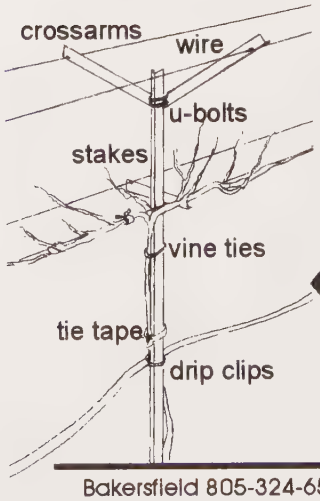

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Value of a good database design

One key element critical to the success of a GIS is the initial database design. The completeness and accuracy of the initial database determines the type and quality of analysis possible, as well as the products available in the final system. Some of the first questions to be answered are: What are the problems to be solved? What are the final products to be made — reports, working maps, presentation-quality maps — and how frequently might each be generated? Who is the intended audience for these products?

"Gathering answers to the questions — What are the problems? Who is going to use the system? What final products are needed? — is the needs assessment phase of the project" explains Dean Roczen, VESTRA's GIS analyst supervising the Hess Collection project. "The needs assessment is used for the subsequent database design. Then the database design ensures our client receives a final product that gives them the information and analysis they need. We will standardize information in the database so our clients are able to have consistent expectations. A mouse-click on any vineyard map display will identify the information they expect, such as block and sub-block numbers, rootstock, clones, date planted, and so forth."

Importance of positional accuracy

Another essential element to the success of a GIS is the positional accuracy of the geographic data. Remember that old computer saying "Garbage In, Garbage Out"? The same holds true for today's modern GIS. Going back to our analogy, if the quilts (the layers) are not positioned correctly on the bed (the project area), the result (the GIS) looks very messy.

One solution to geographically control the GIS is the use of the Global Positioning System (GPS) to orient the precise locations of "patches" within the "quilt." Another solution is the use of orthophotographs (aerial photographs corrected not only for variations in terrain but also for other geographic errors inherent to aerial photographs). Hess Collection uses a GPS technician from VESTRA to gather position coordinates of various features, such as vineyard blocks, preservation oak trees, project boundaries, and underground pipeline locations.

"On one property I needed to isolate several areas that were restricted from planting," explains Camera. "There were two archeological sites, one historical site, and at least two botanical sites. We used a GPS unit to precisely outline these sites, so our compliance to the law is well-documented."

Aerial or satellite imagery is another data-rich source that can provide a wealth of information about where things are located and what they look like. Multi-spectral aerial or satellite imagery (similar to that used in the NASA GRAPES project), uses different

Continued on page 72

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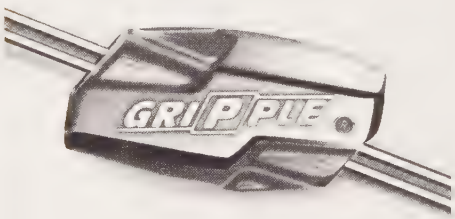

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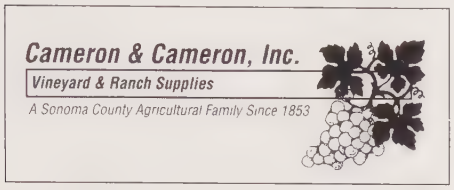

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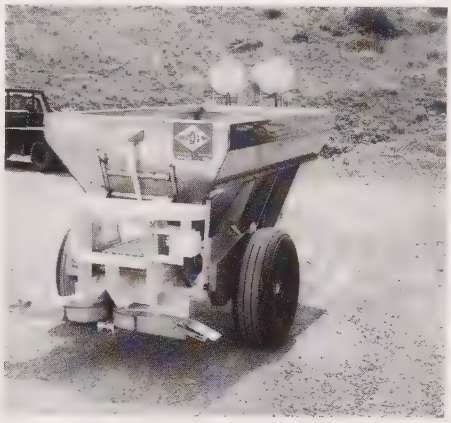

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Ferrari Tractor CIE
PO Box 1045, Gridley, CA 95948
tel: 530/846-6401; fax: 530/846-0390

FOX WEATHER, LLC

Fox Weather provides specialized weather forecasting services for California water management agencies, flood control, and agriculture, including the viticulture industry.

In addition to daily 10-day agricultural weather forecasts for mainly northwestern, central and southern California, Fox Weather has teamed up with Western Farm Service to provide disease weather forecasts for botrytis and powdery mildew in central and southern California. Fox Weather also provides fruit-frost forecasts for clients in the counties of Napa, Sonoma, and Mendocino, as well as southern California and a portion of central California.

Fox Weather also develops meteorological software, including utilities that may be added into the Adcon Telemetry software environment to produce customized exports and analyses of meteorological and biometeorological data. Among the reports generated by Fox Weather's export module are evapotranspiration and a cumulative botrytis index in hourly format for each 24-hour period.

Fox Weather maintains two websites at www.foxweather.com and www.foxweather2.com.

For more information, please contact:
Fox Weather, LLC
3924 W. Channel Islands Blvd.
Oxnard, CA 93035
tel: 805/985-8743; fax: 805/985-3706
e-mail: foxweather@worldnet.att.net

PLEASE SEE FOX WEATHER AD, PAGE 76.

GALO MACLEAN NURSERY

Galo MacLean Nursery offers more than 25 years of nursery experience and provides technical advice on rootstock selection based on site. The nursery specializes in first quality, certified, dormant rootings of rootstocks and dormant benchgrafts.

Rootstock varieties include: 110R, 1103P, Teleki 5C, Kober 5BB, 101-14MG, 3309C, S04, and 140R.

Benchgrafts are made under contract to customer specifications.

Galo MacLean offers crucial expertise, based on backgrounds including degrees in enology, viticulture, agrichemistry, and soil microbiology.

For more information, contact:
Galo MacLean Nursery, Inc.
2160 Cuttings Wharf Rd., Napa, CA 94559
tel: 707/255-8874; fax: 707/255-4579

PLEASE SEE GALO MACLEAN AD, PAGE 75.

PACIFIC WESTERN CONTAINER

Pacific Western Container is the manufacturer of Vine Protectors and Vine Shelters.

A vine with early growth enhancement and protection provided by Vine Protectors or Vine Shelters will always be ahead of a plant of the same age that has none.

Both of these products will give young vines a strong start in the first

growing season and enhance survival by protecting them from wind damage, animal destruction, and chemical sprays. Both will save water and labor costs. Less water is needed because moisture around the plant is retained. Plants can grow taller before tying is needed, reducing labor costs.

The difference between a Vine Protector and a Vine Shelter is primarily the material from which they are made.

Vine Protectors are a white milk carton-type material, poly-coated on two sides. These protectors will last approximately 12 to 18 months depending on field and weather conditions. Traditionally milk cartons have been used with some success. While the idea is good, the size is not. Vine Protectors are much taller and holes are provided for tying to cordon wire. Field tested for three years, Vine Protectors typically outperform traditional milk cartons.

Vine Shelters are made of heavy-duty film treated for proper sun penetration. To install, just wrap the shelter around the vine and insert lock-tabs into opposing holes. The shelters come in colors of blue or peach. They are reusable and more long lasting.

Quantity discounts are available. Call Tim Bynon for a quote.

For more information, contact:
Pacific Western Container
1535 East Edinger, Santa Ana, CA 92705
tel: 800/241-3513 or 714/547-9266
fax: 714/953-9270
website: www.pacificwestern.com

PLEASE SEE PACIFIC WESTERN CONTAINER AD, PAGE 42.

A&P AG STRUCTURES, INC.

A&P Ag Structures, Inc., designs, sells, and installs new, innovative agricultural trellis designs for the viticultural industry.

A&P's design department is devoted to making grapegrowing easier and more productive. New designs, such as the A&P rotator, are rigorously tested to assure a long life and trouble-free trellis. The rotator system is similar to a GDC system except canopy arms can be rotated out to open the vine center to slow down vigor and then rotated back together to allow for mechanical harvesting.

In addition to trellises, the company also sells improved vineyard products such as vine clips, strainers, thread-laid wire, posts, and many everyday products.

Materials in A&P products have been tested for strength and longevity. Trellises are made of rail steel metal, the same metal used for railroad rails and stop signs. All new rail steel products are pull-tested by A&P and independent labs to insure the longest life possible.

The company's installation crews can install complete or partial systems and use specialized equipment to make installation fast and efficient. A&P's customized pounders enable crews to pound almost any post or stake in seconds and are equipped with large drills to reduce post damage when pounding into hardpan.

A&P strives to design and sell only the best products and install with the best crews and equipment, serving clients who want quality and longevity. A&P Ag Structures, Inc., is *"Supporting the grape industry one vine at a time."*

For more information, contact:
A&P Ag Structures, Inc.
11266 Avenue 264, Visalia, CA 93277
tel: 559/685-8700; fax: 559/685-8622

PLEASE SEE A&P AG AD, PAGE 64.

CALIFORNIA GRAPEVINE NURSERY

California Grapevine Nursery, Inc., is a grapevine nursery certified by the state of California Department of Food & Agriculture, providing growers with high-quality planting materials. Available products include dormant rootstock and dormant grafted vines at very competitive prices.

Offering 21 varieties of rootstock and many varieties of scionwood, the nursery is now taking rootstock orders for 1999 and future seasons and custom-grafted vine orders for the 2000 season.

Using state of art nursery practices, California Grapevine Nursery is not only dedicated to providing customers with the highest quality plants available, but also with excellent, efficient customer service.

For more information, contact:
California Grapevine Nursery, Inc.
1085 Galleron Rd., St. Helena, CA 94574
tel: 800/344-5688; fax: 707/963-1840

PLEASE SEE CALIF. GRAPEVINE NURSERY AD, PAGE 70.

WESTERN SQUARE INDUSTRIES

Western Square Industries (WSI) manufactures two-ton harvest bins for the "valley system," both in powder-coated mild steel and in stainless steel. Western Square also makes a variety of field trailers for use with valley bins and half-ton and quarter-ton plastic bins.

Western Square is best known as a vineyard supplier for its narrow row trailers. WSI is the only manufacturer of narrow-row trailers which can take four-foot wide bins down a six-foot wide row. Models which fall into this category are the blue trailer, which holds either one valley bin or two 4'x4' plastic bins, and the gray trailer, which accommodates three 4'x4' plastic bins. Both models feature plastic slides and ramps which allow the bins to slide smoothly off the rear of the trailer using the three-point hitch on a tractor.

Western Square also makes a green trailer for use in conventional rows (over 8 ft. wide) which accommodate either a valley bin or two 4'x4' plastic bins. This trailer also has plastic slides for easy off-loading to the ground. For valley bin users, this trailer makes it unnecessary to have a forklift at the roadhead until the flatbed truck arrives to take away the whole truckload.

For more information, contact:
Western Square Industries
1621 Broadway, Stockton, CA 95205
tel: 209/944-0921; fax: 209/944-0934 OR
1500 Whitehall Lane, St. Helena, CA 94574
tel: 707/963-1584; fax: 707/963-7213

PLEASE SEE WESTERN SQUARE AD, PAGE 7.

AG-RIGHT ENTERPRISES

Ag-Right has put together the simplest picking head available, which can be a canopy shaker, a trunk shaker, or a combination of both to reduce cane damage, cause less juicing and M.O.G., and cover more acres per hour.

The *SLIDER* picking head is made up of a weight box with two counter rotating weights. When in motion, the weights cause the box to slide horizontally on a pair of square tubes connected to the harvester frame. A set of rollers at each corner of the box allow it to float from side to side. This action is a true shaking action instead of a slapping

action found in other picking heads.

At each corner of the box, a piece of pipe extends down vertically, where bow peep style rods are mounted to make a canopy shaker. The rods can be shaped to give a 36-inch or more flat profile along the vine row.

To make the *SLIDER* a trunk shaker, large diameter rods are used and set toward the bottom of the four pipes, which will flex enough to fit each vine and yet have enough force to harvest the grapes. This adaptation also means no stopping to open the head to enter or exit the vine row.

The simplicity of the *SLIDER* with its true side-to-side motion will offer many configurations of harvesting adaptations that have never been possible before. The *SLIDER* can be converted from a trunk shaker to a canopy shaker in one hour.

For more information, contact:
Ag-Right Enterprises
12657 Road 28 ¼ Madera, CA 93637
tel: 209/674-2421; fax 209/674-3328

EQUIPMENT THAT WORKS

The Vineyard Auger is designed to mount on the side of your tractor and be operated from the tractor seat. It operates on eight gallons of diesel per minute yielding 350 lb/ft of torque at 2,000 psi and drills a nine-inch diameter hole 12 inches deep. The unit is available in two boom lengths. The short boom is 32 inches long with an extension of 12 inches and a total reach of 44 inches. The longer boom has a 40-inch stowed length with an extension of 18 inches for a total reach of 58 inches. Choose the length that matches your vine row width and tractor width.

Vineyard Augers are in use from Oregon to Georgia, California to New York. They can be operated from almost any tractor with necessary hydraulic flow. One is mounted on a crawler tractor in the center of the blade mount on a pivot so that the unit can work on either side of the tractor. The standard package includes a nine-inch diameter 12-inch long auger mounted on a boom that will stow within the track of the tractor. The package also includes a three-section control valve that mounts on the floor boards of your tractor or on a platform extension if the tractor is too narrow for both operator and valve control. Up to 250 holes per hour have been reported. Literature available upon request.

For more information, contact:
Equipment That Works
tel: 800/242-4479; fax: 913/677-4614
PLEASE SEE EQUIPMENT THAT WORKS AD, PAGE 74.

PELLENC AMERICA, INC.

PELLENC America, Inc., offers a new model of the field-proven, battery-powered P2000 pruning shear. While the electronics and the brushless motor remain unchanged, the pruner body is now molded in a new top-quality, almost unbreakable material highly resistant to most oils and petroleum products.

Power-assisted pruning improves productivity but usually requires a bulky power source and awkward hoses for compressed air or hydraulic pressure. Not anymore...

A unique 12-oz brushless motor, developed and manufactured by PELLENC, produces one-sixth horsepower at 12,000 rpm and carries a three-year warranty.

The microprocessor-controlled electronic module connects to the 26.4 volt ni-cad battery fitted on an ergonomically designed belt. The assembly weighs 5 lbs. while the pruning shear weighs 2 lbs. and cuts up to 30 mm (1⅛ in.). The shear makes more than 9,000 cuts on one charge and recharges in one hour.

Successfully marketed in Europe for many years, the P2000 has been sold to more than 50,000 customers.

PELLENC America, Inc., opened in Reno, NV, in 1996 and has now opened an office in Healdsburg, CA, which hosts the sales staff and handles shipping/receiving, warranty/after-sale services, and training.

For more information, contact:
PELLENC America, Inc.
Jean-Claude Soleil or **Sabine Chareyre**
468 Moore Lane, Healdsburg, CA 95448
tel: 707/433-7602 or
888/PELLENC; fax: 707/433-7629
e-mail: pellenc@pellenc.com;
website: www.pellenc.com
PLEASE SEE PELLENC AMERICA AD, PAGE 75.

CALDWELL NURSERY

Located in the heart of Napa Valley, Caldwell Nursery is set among the vines of Caldwell Vineyard. The nursery specializes in top quality winegrape clonal selections for the very best wines in French and Italian varieties. Special emphasis is placed on the newly released French ENTAV-INRA® certified clonal material. Caldwell Nursery offers "50-30" Australian hot water treatment for all green-growing bench-grafts and rootings upon request.

After John Caldwell planted special bordelaise clones to improve wine quality in his own vineyard, others wanted what he had, and Caldwell Nursery began selling rootstock and budwood to other nurseries. Rootstock and spring budwood are still available in addition to limited quantities of fall budwood.

Caldwell has released his second edition of the *Concise Guide to Wine Grape Clones for Professionals*. It provides information on wine trials, with respect to soil, climate, and rootstock choices on French, Italian, and American clones.

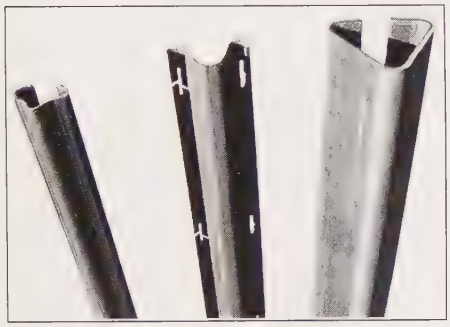
The book is based on 15 years of research, beginning with Caldwell's first trip to Bordeaux, where he was introduced to a clonal program. The book came about because Caldwell wanted to provide an intellectual base for making clonal decisions. "We need to know why we use clones," says Caldwell.

Caldwell also provides consulting on vineyard planning and clonal decisions.

For more information, contact:
Caldwell Nursery
169 Kreuzer Ln., Napa, CA 94559
tel: 707/255-1294; fax: 707/255-5162

JIM'S SUPPLY COMPANY, INC.

Jim's Supply manufactures a variety of trellising products including: high-strength metal grapestakes, line posts, vertical line posts, spaded tubular end posts, standard style crossarms, GDC, lyre and "V" crossarms (shown in accompanying photo), post extensions, metal arbor systems, and trellis braces.



New innovations in vineyard trellising are producing better quality and yield from new and old vineyards. Jim's Supply is in the forefront with new stakes, end posts, and trellis designs. The new Rolled Edge Vertical Line Post and the Superstake, specially designed to save wear on mechanical harvester blades, are sturdy and environmentally correct metal posts designed and manufactured by Jim's Supply.

Jim's Supply also distributes vineyard products including: wood grapestakes and end posts, quality high-tensile trellising wire, tying supplies, nails, staples, electric fencing, fence tensioners, preformed vineline connectors, screw and anchor systems products, crimp sleeves, and tools.

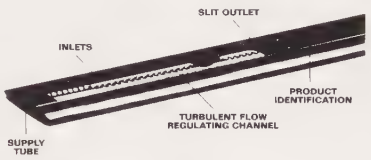
Jim's Supply has stores in Calistoga and Bakersfield and additional sales staff in Fresno and Monterey County and the central coast. To find out how to optimize your canopy management with the trellis designed for your growing area and variety, and to order vineyard products, call the Bakersfield location.

For more information, contact:
Jim's Supply Co., Inc.
3530 Pierce Rd., Bakersfield, CA 93308
tel: 800/423-8016 or 805/324-6514
fax: 805/324-6566
4102 A St. Helena Hwy, Calistoga, CA 94515
tel: 707/942-JIMS (5467); fax: 707/942-9752
In Fresno, tel: 209/420-5365
Monterey, tel: 408/626-0741

PLEASE SEE JIM'S SUPPLY AD, PAGE 46.

T-SYSTEMS INTERNATIONAL, INC.

T-Systems International offers a drip irrigation tape tough enough for permanent crops. Thanks to a new manufacturing process, the T-TAPE TSX Tree & Vine tape has the strength needed to stand up to the demands of vineyard installations.



Growers who install TSX drip tape can expect to pay up to 50% less on their initial investment than for conventional drip hose or micro-sprinkler systems.

Using T-TAPE TSX can also lower energy and pumping costs, because it operates on 40% lower pressure than other drip or micro-sprinkler systems.

For more information, contact:
T-Systems International, Inc.
7545 Carroll Rd., San Diego, CA 92121-2401
tel: 619/578-1860; fax: 619/578-2344

AMERICAN NURSERY

American Nursery and Lake County Grapevine Nursery have formed a joint venture to supply the grapegrowers throughout U.S. with:

- Dormant benchgrafts
- Potted green vines
- Dormant rootings

All dormant and potted vines are produced and grown at the nursery in Clearlake, Lake County, CA. The future western sales office in Calistoga, Napa Valley, underlines the company's commitment to the California grapegrower. The eastern sales office is located in Madison, VA.

The new production facility in Clearlake Oaks in Lake County consists of 250 acres of well-drained, sandy loam for the production of dormant benchgrafts and rootings. New greenhouses will be added to produce potted green vines for the 1999 planting season.

American Nursery is using the highest grafting standards to provide premium grapevines to customers. All vines have a solid graft union, vigorous shoot, and a well-established root system. For quality assurance, American Nursery provides a hot water treatment at 48°C (120°F) for 30 minutes and coats the graft union with a heat resistant wax. The nursery's potted green vines are produced in a Jiffy pot (pressed peat moss) which allows the roots to grow through the pot eliminating root bounding (spiraling).

For the 1999 planting season, American Nursery offers a wide range of varieties and clones on different rootstocks. The nursery also has the new rootstock "Borner" (U.S. Patent) available. The Borner rootstock provides complete phylloxera resistance, effective nematode resistance, and superior drought tolerance.

For more information, contact:
American Nursery
Western Sales
PO Box 132, Calistoga, CA 94515
tel: 707/942-4100
Eastern Sales
Route 1, Box 87 B1, Madison, VA 22727
tel: 540/948-5064; fax: 540/948-5150
Lake County Grapevine Nursery (Production)
4887 New Long Valley Rd.
Clearlake Oaks, CA 95423

THE WATER WORKS

The Water Works has designed water systems for vineyards in the North Coast of California for 25 years. They have pioneered drip irrigation systems and pumping stations to meet the water requirements of different grape varieties and soil types scattered throughout the wine country.

Hillside vineyards are one of The Water Works' specialties. It is a challenge to make sure every vine gets the water required, whether it is at the bottom of the vineyard or at the very top.

Many of the existing sprinkler frost protection systems and pump stations in Napa and Sonoma counties have been designed by The Water Works. These systems do require a lot of water, but they provide the best type of frost protection to date.

The Water Works has designed and installed three of the new pulsator-frost protection systems that have recently been developed. This system requires ¼ of the water and horsepower that conventional sprinkler frost systems use. The pulsator-frost protection system will

allow a lot of vineyards to be frost protected with water, without needing the huge water resources that have been required in the past.

The Water Works has spent many years meeting the water needs of vineyards throughout the North Coast of California. The Water Works hopes they can be of help in developing your project as well.

For more information, contact:
The Water Works
PO Box 446, Rutherford, CA 94573
tel: 707/963-8727

TREESSENTIALS COMPANY

Treessentials Company is the maker of the Clipper and Trilobite Grow Tubes. Treessentials Company Grow Tubes produce thick-stemmed vines with healthy root/shoot ratios. (Stem volume and strong root systems are the key to bigger, earlier yields.)

Treessentials Company Grow Tubes: • are proven in hot and cool climates; • promote accelerated, balanced shoot and root growth; • protect vines from animal damage, sandblasting, and desiccating winds; • reduce irrigation during vine establishment; • reduce vine mortality; • permit in-row weed control with glyphosate; • provide uniform growth; • reduce vine-training costs; • and reduce the time period necessary to achieve full production.

Treessentials Company employs experienced and knowledgeable staff with horticulture-related backgrounds and extensive field experience. The company conducts ongoing research and development with universities and growers under actual field conditions. Plant physiology principles and rigorous testing are the driving force behind Treessentials Company's product development. The company is solely committed to developing superior solutions for plant growth.

Refer to the September/October, 1997 issue of ***PWV*** for profiles of successful, innovative growers using Treessentials Company Grow Tubes.

For more information about Treessentials Company products and other high quality vineyard supplies, such as the versatile JR Clip®, contact:
Vineyard Industry Products Company
John Downer
10603 Old Redwood Highway
Windsor, CA 95492
tel: 800/544-2210 (in California) or
707/431-1356; fax: 707/431-0807

VINTAGE NURSERIES

Vintage Nurseries is a full-service grapevine nursery supplying benchgrafts, rootstock rootings, and own-rooted plants to the wine, table, and raisin grape industries. Vintage Nurseries specializes in the production of dormant field-grown benchgrafts — one of the highest quality grapevine plants available. Vintage also produces green-growing benchgrafts in a 250,000-sqft greenhouse complex.

Vintage NURSERIES
A CUT ABOVE

Vintage doesn't have any silly trademarks or cute marketing gimmicks. The nursery only offers what customers need — a high quality product at a fair price. Vintage is committed to providing its customers with the most competitive pricing in the industry — Vintage believes there is no better value available.

Melinda Richardson, office manager at Vintage Nurseries, says, "With the Vintage Nurseries' quality and price advantage, we are clearly your best option for a new vineyard planting. Call any of our helpful staff or come visit our nursery to see for yourself. Vintage Nurseries is... a cut above."

For more information, contact:
Vintage Nurseries
550 Highway 46, Wasco, CA 93280
tel: 805/758-4777; fax: 805/758-4999

PLEASE SEE VINTAGE NURSERIES AD, PAGE 15.

TITE-WIRE™

Looking for a better way to tighten your trellis wire?

Taylored Products, makers of the "Original" AG-TYE™, is introducing a new fence and wire tensioning device for use in the vineyard. Made of ¼-inch steel rod, Tite-Wire™ slips onto the 12- to 14-gauge wire at any place along the row or fence line that needs to be re-tensioned. The "hook" leg of the Tite-Wire™ locks on the wire to prevent it from unwinding but will allow the worker to retighten or reuse at another time or location.

Designed for use with a Tite-Wire™ tool for heavy tensioning or a regular screwdriver for lighter tensioning, it is fast and easy to use. Tite-Wire™ is economical and can be removed and used at another location.

Tite-Wire™ comes packaged in 250-count cartons and is available from your vineyard supply center.

Tite-Wire™ has a patent pending and is a trademark of Taylored Products.

Watch for other products to be introduced for vineyard use.

Is your vineyard supply center stocking Tite-Wire™?

For more information, contact:
Taylored Products Company
14311 Newport Ave., Ste. G533
Tustin, CA 92780
tel: 714/542-2600; fax: 714/542-8383
e-mail: agtye@juno.com

PLEASE SEE TITE-WIRE AD, PAGE 43.

SONOMA GRAPEVINES, INC.

Sonoma Grapevines, Inc., (SGI) broke all company grafting records in 1998, making 13,737,167 exact fits between scion and rootstock. For the first time in 20 years, Chardonnay was not the #1 varietal grafted. There were more Cabernet Sauvignon plants sold, 3,331,939. Chardonnay vines totaled 3,263,057. Complete yearly grafting data on all varietals and rootstocks can be requested from the Fulton, CA, office at tel: 707/542-5510 or www.sonomagrapevines.com.

A greater variety of clones were grafted, including 18 clones of Chardonnay, 13 for Cabernet Sauvignon, and 26 for Pinot Noir. SGI has the most complete collection of registered virus-free stock in the U.S.

These clones have arrived and are available as certified from Sonoma Grapevines on a first ordered, first served basis. Examples include: Cabernet Franc 331 and 332; Chardonnay 75, 77, 78, 95, 130, 227,352; Gamay Noir 227 and 282; Pinot Meunier 114 and 817; Pinot Gris 152; Pinot Noir 236, 386, 459, 538; Gewurztraminer 456; Sauvignon Gris 253; and eight clones of Cabernet Sauvignon including the Laurel Glen and Jackson selections. There are many more world-respected clones available as non-certified.

With unique varietals for table and wine, niche marketing to superior industry clones, SGI grows and studies them all. Fresh grape sales are made to 28 vintners in order to get feedback as to the value each selection provides to the industry. SGI talks with growing experience when explaining differences in clones and rootstocks.

For more information, contact:
Sonoma Grapevines, Inc.
3600 Fulton Rd., Fulton, CA 95439
tel: 707/542-5510; fax: 707/542-4801
website: www.sonomagrapevines.com

PLEASE SEE SONOMA GRAPEVINES AD, PAGE 42.

VINEYARD WATER SYSTEMS

Vineyard Water Systems specializes in providing grapegrowers with practical solutions to their drip and micro-irrigation challenges. Staff members' experience in the winegrape industry as licensed pest control advisors, certified crop advisors and certified irrigation designers allows them a unique perspective in irrigated vineyard management.

In addition to helping growers create new projects by providing irrigation designs and bid reviews, they are also able to apply their experience to the management of existing systems.

Addressing the issues of filter maintenance, fertigation and chemigation, water chemistry, emitter plugging challenges, and system automation are all within the realm of their experience. Both partners of Vineyard Water Systems, Lizanne Wheeler and Patrick Brown, are skilled as bilingual trainers and can provide customized training to vineyard irrigation management teams.

When it comes to addressing the challenges of applying the appropriate amounts of water and nutrients to your vines in a safe and economical manner, you can make your management team the most efficient possible by calling Vineyard Water Systems, the vineyard irrigation specialists.

For more information, contact:
Vineyard Water Systems
521 Lucerne Rd., Cayucos, CA 93430
tel: 805/995-0587; fax: 805/995-0205
website: www.vineyardwater.com

UPPER VALLEY RECYCLING

Upper Valley Recycling is located in the heart of Napa Valley and specializes in a "grape" kind of compost!

Upper Valley, founded over 30 years ago by the Pestoni family, is committed to assisting vintners and grapegrowers in the Napa Valley with environmental services. Recycling programs deal with a wide range of materials, from corrugated cardboard and office paper to wine bottles, shrink wrap, and grape pomace, and more.

Upper Valley works with more than 50 environmentally conscious wineries to process grape pomace during harvest each year. The end result is a grape compost that is 100% organic and qualifies for use in certified organic crops.

Upper Valley Recycling produces three standard blends for vineyards: Harvest Compost, which is 100% grape pomace; Super Mix I, which is 50% Harvest Compost and 50% ore-mined gypsum; and Super Mix II, which is 50% Harvest Compost, 25% ore-mined gypsum, and 25% ore-mined limestone.

Harvest Compost used in trial studies conducted by Dr. Paul Skinner has been proven to increase fruit yield by three pounds per vine.

Upper Valley Recycling is committed to "closing the loop," offering complete compost application services, with equipment to apply compost to vineyards ranging from five feet to open field.

For more information, analytical reports or other recycling questions, contact:
Upper Valley Recycling
1285 Whitehall Ln., St. Helena, CA 94574
PO Box 382, St. 94574
tel: 707/963-7988; fax: 707/963-5584

AVIDOR LEAF REMOVAL SYSTEMS

The Avidor Prima is one of the most sophisticated leaf removal systems on the world market today.

Leaf removal from the fruit zone reduces botrytis bunch rot and improves grape quality (higher polyphenol content, better sugar/acid ratio, better coloration). Costs for hand harvest are significantly reduced.

The Avidor machine is mounted on the three-point hitch of a 40 or 50hp tractor with auxiliary hydraulics. The hydraulically positioned heads can be operated individually or together on both sides of the row. They are guided by an automatic system of gas pressure shocks and electro-hydraulic controls. The grade of leaf removal can be

adjusted individually. The result is a perfect operation with little or negligible damage to the grape clusters.

The Avidor Prima operates ideally in shoot-positioned vineyards (VSP, lyre, etc.). Cost of operation is significantly less than that of hand removal. Performance under average conditions is 1.25 to 1.5 acres per hour (8-ft. row spacing).

The Avidor Prima is manufactured by Avidor S.A., located in the viticultural region of Lake Geneva, Switzerland. Avidor specializes in the development of new viticultural technologies and is the recipient of several international awards for technical innovations.

For more information, contact:
AVIDOR Inc.
5753 W. Barstow, Ste. 102, Fresno, CA 93722
tel: 209/276-6828; fax: 209/276-7493
PLEASE SEE AVIDOR AD, PAGE 72.

BIO

Biologically Integrated Organics (BIO) gives today's grapegrower the microbial edge for more complex, higher quality grapes resulting in greater crop value. BIO's products optimize plant performance by restoring beneficial microbial activity to soil/vine systems. BIO believes the diversity of microbes and the increase in microbial activity has a direct effect on the quality of the finished wine product.

bio™
Biologically Integrated Organics, Inc.

BIO's easily applied, liquid inoculant goes directly into the root zone through existing vineyard irrigation systems, creating stronger, healthier vines that are more naturally resistant to pathogens. Its biologically derived soluble humus provides a food source, allowing microbes to establish their own niche in the soil profile.

BIO's strength lies in the proliferation of a broad range of microorganisms, which is inherently more durable and effective in the soil than the application of a clinically isolated few organisms.

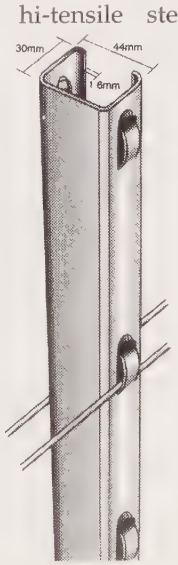
BIO's organic products compliment and improve the effectiveness of conventional agricultural management programs. In situations where chemicals no longer produce results and in organic growing situations, BIO products provide answers. BIO helps growers adapt and excel in today's tougher agricultural environment.

BIO products include Ceres, a diverse microbial inoculant that helps reestablish biological balance to the soil, and LiquiComp, a concentrated biologically active liquid compost.

For more information, contact:
BIO
2530 N. Miami Ave., Fresno, CA 93727
tel: 888/624-6564
e-mail: sales@bio-com

DM PLASTICS & STEEL

"Vinstake," by DM Plastics & Steel, is a "C"-section steel post specifically designed for vineyard trellising using catch (lift) wires. Manufactured from heavily galvanized hi-tensile steel, Vinstakes are easy to install in new or existing vineyards, with the wire attachment points approximately five inches apart to suit various wire spacings.



Vinstakes have a unique tag for wire attachment, allowing very easy vertical movement of the catch wires; the wide tag withstands heavy loads. Wires are simply vertically snapped in or out of the spring action tag. The snap-in tag system is ideal for low-cost mechanical lifters and also allows insertion of a poly-wire guard for protecting the cordon and drip wires against wear.

Vinstakes may be manually or mechanically driven into the soil in new or existing vineyards. Soils compact in the "C" section to stabilize the post firmly in the ground. The "Springflex" action of the Vinstake allows deflection during harvesting without damage.

Vinstakes are available as trellis posts or extensions for existing wood or T-posts. The tags are approximately five inches apart. Vinstake lengths are from 14 inches to four feet as extensions and 4-foot 4-inches to 9-foot 8-inches as posts.

For more information, contact:
DM Plastics & Steel
PO Box 4, Enfield Plaza, S.A. 5085, Australia
tel: 618 83497654; fax: 618 83495431
e-mail: sales@dmplastics.com.au

SUNRIDGE NURSERIES

Sunridge Nurseries Inc. has been serving the wine and table grape industry for 30 years. Owner-managers Glen and Craig Stoller bring years of experience and knowledge to the rapidly expanding business, which offers both green and dormant benchgrafted vines as well as rootstock rootings and potted plants.

In 1999, Sunridge customers will have access to authentic French clonal grape stock trademarked by ENTAV-INRA®. This nursery stock is produced from a vast library of clones selected and tested by the French. Thirty-six winegrape clones and eight rootstocks have been planted in mother blocks; another 40 clones are in quarantine and will begin to be ready for customers in the year 2000.

Sunridge has designed, developed and is testing a new type of soil to grow traditional benchgrafts. It is an innovative solid soil that will hold root systems together so containers can be removed upon planting. The new soil will enable customers to produce a vine that will not go into shock at planting and will produce a deep-rooted grapevine.

Because growing and grafting grape stock is Sunridge's only business, the

nursery is able to concentrate on customers' needs and expectations. Superior stock and expert care mean the product you'll receive is among the best; the personalized attention you'll receive is second to none.

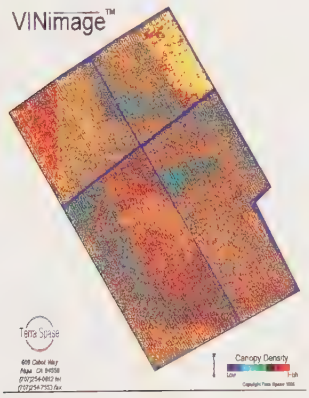
For more information, contact:
Sunridge Nurseries, Inc.
441 Vineland Rd., Bakersfield, CA 93307
tel: 805/363-VINE

PLEASE SEE SUNRIDGE NURSERIES AD, PAGE 44.

TERRA SPĀSE

Terra Spāse™ offers the latest technologies for the study of vineyard soils, weather, vine growth, and fruit production, assisting vineyards and wineries in purchasing, installing, training, and using geographic information system (GIS) software and GPS for improving vineyard data management and analysis capabilities.

The company uses a customized GIS software program, *Terroir*™ , to produce soil variability maps of surface and subsurface soil conditions and to calculate soil vigor potential. *Terroir*™ maps are used in scion, rootstock, spacing, and trellis selection, vineyard feasibility analysis, design, layout, irrigation and drainage, and site specific fertilizer and soil amendment applications.



Terra Spāse™ operates networks of Adcon weather stations and produces weather and disease risk maps for areas of Napa, Sonoma, Santa Barbara, and Monterey. The maps are used for monitoring potential powdery mildew occurrence, tracking growing conditions, estimating evapotranspiration, monitoring soil moisture, and calculating growing degree days.

Using aerial multispectral imagery, Terra Spāse™ produced NDVI (normalized difference vegetation index) images of vineyard canopy density in Napa, Sonoma, and Lake counties during the 1995, 1997, and 1998 seasons. The company's VINimage™ aerial imagery has been used to segment uniform blocks at harvest and to map vine canopy densities for improving pruning decisions, nutrition and irrigation management.

For more information, contact:
Terra Spāse
609 Cabot Way, Napa, CA 94558
tel: 707/254-0612; fax: 707/254-7553
e-mail: terraspase@earthlink.net

NOVAVINE GRAPEVINE NURSERY

NovaVine Grapevine Nursery is located in Sonoma Valley four miles west of Kenwood in Santa Rosa. NovaVine's benchgrafted vines are among the highest quality in the industry, produced using tried and tested European methods developed in Italy by Vivai Cooperativi Rauscedo (VCR), one of the world's most respected grapevine nurseries.

NovaVine gives particular attention to the quality of rootstock and scion materials selected for benchgrafting. Only mature cuttings grown under ideal climatic conditions are chosen and grafted using methods perfected over 65 years. NovaVine's field increase block is located in Woodland, CA, where the plants are regularly inspected for inclusion in the state's nursery certification program. NovaVine produces growing, potted, benchgrafted vines and field-finished, dormant, benchgrafted vines.

NovaVine offers a complete selection of CDFA nursery-certified rootstock and scion materials. In association with VCR, in spring 2000, NovaVine will release 20 proven European grapevine selections, including high quality clones of Aglianico, Barbera, Cabernet Franc, Chardonnay, Montepulciano, Pinot Bianco, Pinot Grigio, Pinot Nero, and Sangiovese.

Not only are physical product quality and availability of the best clones important to NovaVine, but so is the ability to provide the best advice and customer service to growers of all levels of experience. NovaVine staff would like to visit your vineyard site, advise on soil analyses, or help with any of your vineyard planning or management concerns. Please call NovaVine for further information or to arrange a nursery visit. The company motto is "NovaVine — The Quality Choice."

For more information, contact:
NovaVine Grapevine Nursery
6735 Sonoma Highway, Santa Rosa, CA 95409
tel: 707/539-5678; fax: 707/539-2819
e-mail: info@novavine.com
website: www.novavine.com

PLEASE SEE NOVAVINE AD, PAGE 34.

MILLCREEK MANUFACTURING CO.

Millcreek Manufacturing has introduced a new high-capacity version of its row mulcher for applying compost and mulch in rows. The Model 2000 Row Mulcher has a 20-cubic-yard capacity, and can mulch rows up to half a mile long with one load. Row mulchers are widely used on a variety of crops, including grapes and citrus, as shown in the photo.

The Model 2000 Row Mulcher typically saves two-thirds of the time and labor for mulch application compared to conventional methods. It applies 20 cubic yards of mulch in rows in approximately 15 to 20 minutes, depending on machine settings and allows a single operator to apply mulch to an acre in about two hours, depending on row spacing. Mulch beds can be adjusted from 12- to 84-inches wide, from ½- to 12-inches deep.

Six smaller sizes, from 3.4- to 13-cubic yard capacities, are available. Prices start under $6,000. Millcreek also produces custom row mulchers.

For more information on Millcreek Row Mulchers, contact:
Millcreek Manufacturing
tel: 800/879-6507

PLEASE SEE MILLCREEK MANUFACTURING AD, PAGE 16.

KIMCO MANUFACTURING, INC.

With the Kimco Model-9300, in-row cultivation of vines has evolved from infancy in the early 1980s to a highly efficient means of mechanical weed control by mid-1990s. The Kimco operates in virtually all terrain, from flat to hills. The Kimco can remove weeds and grasses from fresh-sprouted to six feet high. It can operate in rocky, hard, soft, wet, or dry soil. Whether the vineyards are irrigated by flood, sprinkler, or drip (as long as the line is suspended) the Kimco works equally well. The row surface can be flat or in berms.

With the introduction of a front mount, the Kimco operates in virtually any row width where a tractor will fit. For the larger grower, the Kimco can be double-mounted (one on each side of the tractor) to more than double productivity.

In all cases, the Kimco is mounted in front of the operator for easier control. With the standard automatic trip, the operator can concentrate on driving and allow the machine to cycle as the trip contacts a vine. The operator has a manual override to provide complete control.

The Kimco's versatility and efficiency are overshadowed only by its durability. It was designed and built to operate every day with only minimal maintenance.

For more information contact:
Kimco Manufacturing, Inc.
9200 W. Barstow, Fresno, CA 93722
tel: 800-356-9641 or 559/277-4300;
fax: 559-277-9358
e-mail: Kimcotill@attitude.com

PLEASE SEE KIMCO MANUFACTURING AD, PAGE 47.

VINIFERA NURSERY

From the smallest replant orders to orders for the largest new acreage, Vinifera has your vines.

Vinifera, Inc., offers growers premium quality, disease-tested wine and table grape plant material. To meet grower needs, Vinifera produces a choice of plant material:

Herbaceous grafts: In Vinifera's unique grafting method, green scion cuttings are grafted onto green rootstocks. Herbaceous grafting results in vigorous vines with virtually undetectable graft unions and exceptionally well-developed root systems.

Traditional benchgrafts: A longtime industry standard.

Rootstock rootings.

Foundation stock is in-house ELISA-tested for leafroll, corky bark, and fanleaf virus disease before propagation and grafting. After green grafting, vines are delivered or field-finished to industry standards.

Selection: Vinifera offers its customers more than 12 rootstocks and 100 scions to choose from, making it possible to fill orders from the most sought after scion/rootstock combinations to specialty, hard-to-find clones.

Availability: Bareroot and pot-dormant plants (both herbaceous grafts and benchgrafts) are available for delivery February through May. Greengrowing benchgrafts deliver April through May and greengrowing herbaceous grafts deliver June through August.

Dedication to customer service: Vinifera has a company-wide commitment to customer service. From pre-plant considerations to follow-through in the field, the staff and management of Vinifera are dedicated to helping growers solve problems and achieve superior vineyard results.

For more information and a detailed product availability list, contact:
Vinifera Nursery
Dave Nelson, tel: 800/648-1681
James F. Pratt, tel: 707/773-4557
4288 Bodega Ave., Petaluma, CA 94952
tel: 707/773-4557; fax: 707/773-0665

PLEASE SEE VINIFERA NURSERY AD, PAGE 28.

EASYGROW VINEGUARDS

The Easygrow Vineguard is cylindrical, formed from a single sheet of UV-treated plastic. It is reusable over several seasons, and easy to assemble and fix to the wire. Above all, its 95mm diameter accelerates growth without compromising root and trunk development.

It has a unique tongue-in-groove locking system, making it quick and easy to lock and unlock many times over without breaking, and allowing easy access to the vine. The method of fixing to the wire is simple yet highly effective, and when the wedge at the base is driven into the soil to the recommended depth, it remains stable under the most adverse conditions.

Dr. Richard Smart recommends the Easygrow Vineguard. One of the world's most influential viticulturists, Dr. Smart, the "Flying Vine Doctor" comments, "The Easygrow Vineguard is a brilliantly simple idea. It saves time in the vineyard, keeps out damaging levels of herbicide spray, and yet still allows some air to circulate. It provides the one thing that all grapegrowers want — a faster return on their investment. Using this system, along with good management practices, growers are assured of early growth and yields so essential for vineyard profitability."

For more information or a sample, contact:
Easygrow Talga Vineyard Operations P/L
44 Durham St., Stanmore, NSW Australia 2048
tel: 612-9560-3030; fax: 612-9568-1010
e-mail: easygrow@bigpond.com
website: www.easygrow.com.au

TECHNIQUIP

TechniQuip has introduced an innovative new portable refractometer, BrixStix. BrixStix greatly simplifies the task of accurately determining the percent concentration of sugars and other dissolved solids in a variety of liquids.

BrixStix's digital display virtually eliminates repeatability errors. Highly repeatable measurements and a $500 list price make BrixStix the first of its kind in a marketplace long dominated by optic devices vulnerable to operator-induced measurement errors.

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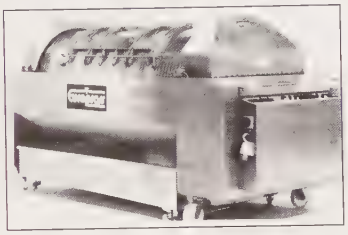

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sample dish. In the laboratory, the fully waterproof instrument can be inserted into a beaker of liquid to obtain measurements.

BrixStix comes in two models: the 100, with a range of 0° to 30° Brix, and the 200 model, with a range of 0° to 75° Brix. Both units have near perfect repeatability and demonstrable accuracies of 0.2° Brix. TechniQuip products are sold on a wholesale basis to quality instrument dealers worldwide.

For more information, contact:
TechniQuip
Christine Hill
191 Wright Brother Ave., Livermore, CA 94550
tel: 888/414-0789; fax: 925/447-2201
e-mail: ch@TechniQuip.com

PLEASE SEE TECHNIQUIP AD, PAGE 77.

WEED BADGER DIVISION

Weed Badger Division manufactures a full line of hydraulic rotary vineyard tillers and other in-row management tools. More than 10 upgradeable Weed Badger models provide cost-effective tool carriers for a variety of attachments including the Sweeper/Tiller attachment, Cyclone Spade™, and Brush Rake attachment.

Weed Badger high-speed, precision, in-row rotary tillage is an economical alternative to chemical weed control. Weed Badger is more than just a grape hoe. It is the only tool of its type to remove big weeds, aerate, and sweep trash out of the rows — a real boost to IPM programs. It is the #1 choice for conventional grapegrowers, organic growers, and research centers.

Weed Badger removes all weeds in the strips including Johnson Grass, Bermuda Grass, and increasingly herbicide-resistant weeds without the hassles, risks, and potential legal problems from workers or neighbors. Removing vegetation from the strip reduces insect pests linked with vine diseases and controls mice, voles, and other rodent pests by allowing predators to do their job.

Weed Badger Division has produced high quality, rugged vineyard tools for

over 19 years. Take advantage of excellent factory-direct service and prices.

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Weed Badger Division
5673 SE 95 Ave., Marion, ND 58466
tel: 800/437-3392; fax: 701/778-7501
e-mail: weedbadg@drservices.com

PLEASE SEE WEED BADGER AD, PAGE 27.

LORANE GRAPEVINES/ KING ESTATE VINEYARDS

King Estate
OREGON
LORANE GRAPEVINES

At Lorane Grapevines, the key words are quality and sustainable agriculture. The nursery's main goal is to produce the best vines for your vineyard, while keeping a watchful eye on the environment. Lorane Grapevines uses only certified rootstock in all its grafted vines. Climate-controlled greenhouses allow the company to give vines the best start possible. The special soil-less growing medium has natural beneficial fungi and bacteria, which help to get your new vineyard off to a healthy start. Lorane Grapevines' specialties are the Dijon clones of Pinot Noir, Chardonnay, and Pinot Gris, plus the nursery's ability to graft to your specific needs. Lorane Grapevines fits hand in hand with your company, large enough to fill your vineyard yet small enough to care.

For more information, contact:
Lorane Grapevines/
King Estate Vineyards
80854 Territorial Rd., Eugene, OR 97405
tel: 800/884-4441 or 541/942-9874
fax: 541/942-9867
website: www.kingestate.com

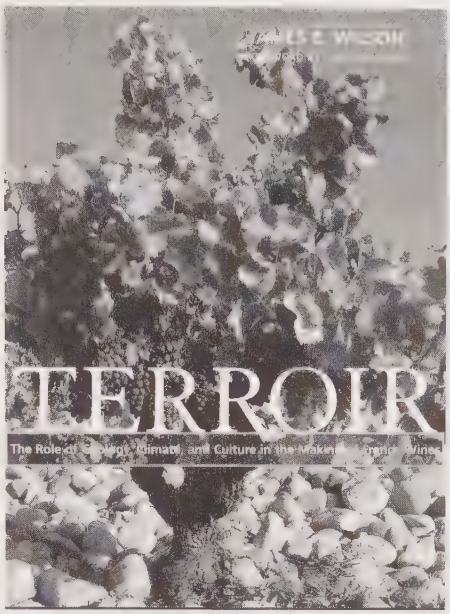
PLEASE SEE LORANE GRAPEVINES AD, PAGE 47.

Exploring the geology of French wine regions

"Why do the fine wines of France grow where they do? How is it that one vineyard yields superior wine, while its neighbor that appears the same does not?" These questions inspired James E. Wilson to study the geology of vineyards in France for more than 20 years, and now he has written a book about what he learned.

Published by the University of California Press in association with The Wine Appreciation Guild, ***Terroir:*** *The Role of Geology, Climate, and Culture in the Making of French Wines* looks beneath the surface to discover the influence of vineyard geology on wine quality. "Geology," Wilson says, "dictates the overall landscape, rock type, the land form, the exposure, soil, subsoil, and drainage."

A wine lover, Wilson is a geologist and former vice president for exploration and production at Shell Oil. He



has applied many of the same techniques he used searching for oil to search out "how the [French] *terroirs* function," with the one added advantage, he reports, of being able to "drink on the job."

The book is divided into two sections. In the first, Wilson discusses "the components of the French *terroirs*" and how they interact with each other and with climate to produce good grapes. In Part II, he examines the specific geology of each wine region — from the chalk of Champagne to the gravel mounds and limestone plateaux of Bordeaux and the geologic complexity of Languedoc-Roussillon. He considers how, over 2,000 years, "the vignerons learned through trial and error how to bring out the best from their land."

Wilson claims in his introduction that "***Terroir*** is not a technical book," and though the technical information is there, it's approachable and leavened with ample photographs, illustrations, clear explanations, historical tidbits, and humor. For example, he explains, "Plants don't eat rocks *per se*, but sip on mineral concoctions dissolved from them." Sounds like the vine's equivalent of fine wine.

Ultimately, however, ***Terroir*** is primarily about geology. Understanding the contribution it makes in the 11 wine regions of France may prove useful to growers and vintners elsewhere in the world who want to compare their own vineyards' geology and climate with a relevant area in France for the purpose of benefiting from the French breadth of experience in crafting fine wines from similar resources.

Terroir: *The Role of Geology, Climate, and Culture in the Making of French Wines*

University of California Press, Wine Appreciation Guild — $50 U.S.

336 pages, 58 color plates, 84 maps and graphics, nine photos, two tables

To order this book, see *PWV* Bookshelf on page 68.

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GRAPEVINE NURSERY expansion & improvements

By Carolyn Dempsey

The bountiful vineyard crops of 1997 marked a watershed in the grapevine nursery market, which previously had to hustle to feed the seemingly insatiable demands of the burgeoning U.S. wine industry. Two contributing factors to these sellers' market conditions included the growth and changing varietal make-up of wine vineyards and the need to replant disease-infested crops.

While the phylloxera epidemic has been brought under control, other afflictions have subsequently stolen the pestilence spotlight, such as young vine decline, leaf roll, corky bark, and nematodes. Approaches to dealing with these problems, coupled with changing market conditions, are a main focus for grapevine nurseries today. With the expansive lot of 1997 fruit came also a bellwether of change for nurseries: Market demand is leveling off, and there is finally enough supply. Consequently, suppliers to winegrowers are looking to distinguish themselves in a buyer's market.

To stay competitive, nurseries are turning to improved efficiency and higher levels of service to maintain their healthy businesses. Because of this, vineyard managers and winegrowers will find a variety of nursery options and services available to suit their needs. Presented here is a sampling of grapevine nurseries and their recent service and facility developments, along with information about clonal innovations and specialties.

American Nursery

American Nursery in Virginia and Lake County Grapevine Nursery in Clear Lake Oaks, CA, have recently joined to supply grapegrowers throughout the U.S. with dormants, potted green vines, and dormant rootlings, American Nursery's Joachim Hollerith reports. "All vines are produced and grown at the nursery in Clearlake Oaks. The future western sales office will be located in Calistoga to better serve California grapegrowers, and the eastern sales office is located in Madison, VA."

At the new facility in Lake County, the nursery is adding greenhouses for growing potted green vines for the 1999 planting season. Currently, this facility produces dormant bench grafts and rootings on 250 acres of sandy loam.

"We use high grafting standards to provide premium grapevines to our customers," says Hollerith. "For quality assurance, we provide a hot water treatment at 48°C (120°F) for 30 minutes and coat the graft union with a heat-resistant wax. Our potted green vines are produced in Jiffy pots of pressed peat moss which allow the roots to grow through the pot, eliminating bounding and spiraling."

For the 1999 planting season, American Nursery offers a range of varieties and clones on different rootstocks. "We also have the new 'Borner' rootstock (U.S. patent) available which provides complete phylloxera resistance, effective nematode resistance, and superior drought tolerance," describes Hollerith.

Caldwell Nursery

Caldwell Nursery (Napa, CA) propagates 250,000 green-growing bench-grafted vines per year. "All wood for grafting is subjected to the Australian developed hot-water treatment (50°F for 30 minutes, known as "50-30"), killing all fungi known to contribute to young vine decline," says John Caldwell, owner.

In June 1998, Caldwell Nursery signed a licensing agreement with ENTAV-INRA®, the French grapevine clonal germplasm repository, located near Montpellier. Caldwell is now able to offer North American winegrape growers 73 ENTAV-INRA® clones and rootstocks. After a two-year quarantine in Missouri, 42 of these clones are now being planted in a 100-acre, virgin, mother block in Yolo County, 45 minutes outside of Napa Valley.

Caldwell Nursery will provide budwood from a limited number of scions in the fall of 1999, green-growing bench-grafted vines in the spring of 2000, and rootstock rootings not before early 2001.

ENTAV began in 1962 as ANTAV, National Technical Association for Improvement of Viticulture, to improve the sanitary and qualitative status of French clonal material. In the past 30 years, ENTAV has introduced more than 16,000 clones, more than 700 of which have become certified varieties, including 580 wine, 40 table grape, and 100 rootstock types. For this, the grower pays a $.30 royalty for each plant delivered. This royalty supplements French governmental funding along with funds collected from direct sales from French mother blocks to further clonal research and development.

Other grapevine nurseries will be able to sell ENTAV-INRA® grapevines by becoming ENTAV licensees and obtaining their mother vine material from Caldwell Nursery or Sunridge Nurseries. "ENTAV-INRA® usage may grow to as much as 30% in U.S. vineyards in the next decade," predicts Caldwell.

For educational purposes, Caldwell plans to provide to growers and winemakers a micro-vinification (375ml sample bottle) of all clonal material from the ENTAV-INRA® mother blocks.

For years, Caldwell has championed the U.S. importation of ENTAV vines. He has also written *A Concise Guide to Winegrape Clones for Professionals* with French co-author Philippe Melka. First published in 1997, the book is in its second edition. Its release is in sync with the timing of the initial release of ENTAV-INRA® clones in the U.S. Caldwell wrote the book because "most of the information on clonal work is only available in French because that's who conducts it. Its value lies in the fact that the French research is done from the end result standpoint of wine quality,

not fruit quality." (Book available from *PWV*-**Bookshelf**.)

California Grapevine Nursery, Inc.

California Grapevine Nursery, Inc., (St. Helena, CA) has recently doubled its greenhouse space by adding a new 7,200-sq.ft. location in Livingston, CA, to complement the already existing 7,200-sq.ft. St. Helena location. "The new Livingston nursery has outdoor growing grounds which provide the sandy soil necessary for successful cultivation," according to vice president Rich Salvestrin. "Also," he adds, "a subsurface drip irrigation system enables us to efficiently provide water and nutrients for the vines."

Increase block plantings at California Grapevine Nursery have grown to over 80 acres of rootstock and 40 acres of scion, reports Salvestrin. Saw or Omega methods are used for all grafting.

Domaine Chandon Nursery

Domaine Chandon (Yountville, CA), has 8,000-sq.ft. of greenhouse space and 10 acres of rootstock increase block. A self-aligning and self-adjusting Omega grafting machine is used, which locks the two sections of vines together tightly, promoting easy callous growth.

Duarte Nursery, Inc.

Duarte Nursery, Inc., (Hughson, CA) has upgraded its facilities. "Two new 43,000-sq.ft. production buildings are in operation in 1998," says John Duarte, vice president. "The first is for rootstock and scion preparation and grafting. The second houses our new hydroponic callusing system, which has increased our vine success rate and quality while reducing the incidence of fungal disease. It replaces traditional callusing box media with a more carefully controlled callusing environment."

"The hydroponic callusing system is proprietary, and we're patenting it," Duarte continues. "We are also patenting a new grafting technique which uses a hand-wrapped polyfilm to protect the graft instead of wax. This technology strengthens the graft union by protecting the callus from drying-out even after vines leave the callusing room."

Duarte points to the improved field performance of Duarte Nursery vines since the implementation of these tech-

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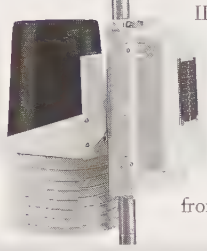

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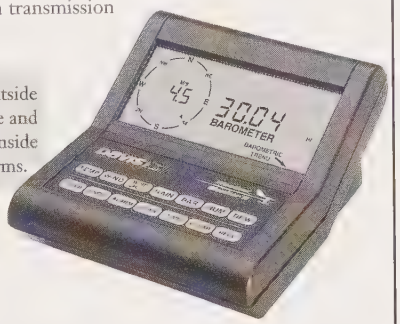

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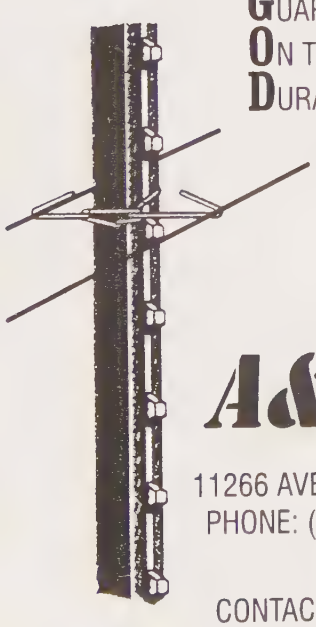

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nologies, which he claims has improved the company's capability for making early deliveries and fulfilling the vast majority of orders. "We have provided very few replacements this year, in fact," he calculates, "we have over three million extra vines to sell."

A new pad-and-fan cooling system has been installed throughout the 22-acre greenhouse facility at Duarte Nursery. Duarte explains, "This evaporative cooling system allows us to better control our greenhouse temperatures, which improves our grapevine success rate and quality. We are also introducing automated greenhouse controls, through which all of our temperature, airflow, and humidity systems are centralized with a common nursery-wide system."

Outdoor expansion includes 10 new acres of hardening space where the "Big Pot" bench grafts sit outside in direct sunlight in preparation for upcoming appropriate field conditions. In 1998, Duarte Nursery planted an additional 100 acres of grape rootstock, grown from tissue culture, to augment the existing 340 acres of grape scion and 160 acres of grape rootstock already established.

Lorane Grapevines

In Oregon, Lorane Grapevines is part of the King Estate Winery located in Eugene. Lorane Grapevines does all its bench grafting, using Omega 3 machines, and is "exploring green grafting and mist propagation," explains nursery manager Tom Lodge.

"We currently use peat moss, pumace, and an onsite compost as the soil media for our potted vines. Our compost has beneficial fungi and bacteria to create an ideal growing environment for the roots. We use only organic fish-emulsion and plant-extract fertilizers. For disease and insect control, our primary agents are sea kelp, compost tea, copper, and sulfur sprays. We never use commercial fungicides, herbicides, or insecticides anywhere."

In 1998, Lorane grafted 658,000 grapevines on a 2:1 ratio based on contracted sales, that is for every grapevine ordered, Lorane grafts two grapevines as insurance in case the first graft doesn't take successfully. California and Oregon are the company's primary markets, followed by New York state.

Lorane Grapevines monitors and studies its soils to ensure that they are minerally balanced. Lodge recently sent a sample of grape root systems to Dr. Elaine R. Ingham of Soil Foodweb, Inc., (Corvallis, OR) to determine if mycorrhizal fungi, which protects against root pathogens and root-feeding nematodes and improves soil structure by binding soil aggregates into larger, water-stable aggregates, was present in the potting mix, peat moss, perlite, and compost mixes.

"In all three samples," Lodge reports, "low amounts of this fungi were present in the root systems of our two-month-old vines. This fungus promotes plant nutrition via soil nutrients, which are exchanged with the plant for carbon. We use a soilless planting material based on Neal Kinsey's recommendations, and microbiological assays based on Dr. Ingham's lab recommendations."

Facilities at Lorane include nine double poly-covered greenhouses and a 10,000-sq.ft. polycarbonate greenhouse with rolling benches. "Since they are bottom-heated, we can control our growing environment through specific heat and ventilation practices, which prevent fungus growth on the vines," according to Lodge. He adds that with overhead-irrigated greenhouses, he is also able to provide nutrient additives as needed.

NovaVine Nursery

Founded on 27 acres in 1996, NovaVine Nursery (Santa Rosa, CA) expanded in August 1998 with a long-term lease and farming agreement for development of more than 100 acres of CDFA certified increase block in Woodland, CA. This venture was arranged with Yolo Vineyards and Neilson Ranch. Dr. James Stamp, NovaVine chief executive officer, explains, "Establishment of a reliable source of quality materials for our bench grafting program is critical to our success. Woodland's climate, soils, and water are ideal for production of cuttings for our grafting operations."

Other recent expansion in Santa Rosa includes a 2,000-sq.ft. propagation house, equipped with fog and under-bench heat, and construction of a 6,000-sq.ft. greenhouse for container vines. NovaVine has also begun building a 7,500-sq.ft. cold storage system.

The world's largest grapevine nursery, Vivai Cooperativi Rauscedo (VCR) of Rauscedo, Italy, became NovaVine's second largest shareholder in 1997. This partnership brings NovaVine exclusive rights to VCR's Italian clones and grape varieties and access to the company's production technology and marketing. "Our partnership with VCR will allow us to assimilate Italian and European viticultural technology, know-how, research, and marketing techniques into our California-based operations," says Stamp.

With operations in more than 20 countries and sales topping 35 million vines annually, the VCR nursery north of Venice has developed over 50 premium European grapevine clones, many of which were imported to the U.S. in 1998. After two years of disease status evaluation at FPMS, the clones are scheduled for release from quarantine in spring 2000. NovaVine subjects all certified selections to independent disease analysis prior to propagation. These materials include grafted growing potted vines, grafted dormant field-finished vines and rootstock, and grower-supplied plants.

Sonoma Grapevines, Inc.

The 1998 season is the 26th anniversary of Sonoma Grapevines, Inc., (SGI) in Santa Rosa, CA. The company has expanded and added four grafting facilities. Each of the new facilities is designed to serve different customer needs.

There is now a 28,000-sq.ft. cold storage facility near Santa Rosa in Fulton, from which dormant vine deliveries are made. A new greenhouse, buildings for grafting and cuttings and a new customer service office were built in Fulton.

An additional facility in Fresno has doubled the company's greenhouse space and provides a new cold storage plant. SGI also has a Madera County field-growing facility.

SGI increased its scion wood acreage by 100 acres for the 1998 grafting season to provide customers with a more varied selection. The company now farms over 1,000 acres, 350 of which are in a

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field-grown nursery of vines, rootstocks, and bench grafts. The other 650 acres are comprised of registered increase blocks, including 80 new varietal and clone releases. The complete inventory can be found at: www.sonomagrapevines.com.

"Grafting is done in a 26,000-sq.ft. facility in Fulton," says president Rich Kunde, "with heated grafting tables for winter work. There are cutting, soaking, hot water baths for pest control. One-half million cuttings can be processed there daily, using either saw or Omega grafts depending on customer preference. The complex is structured so that all orders, from one to over one million vines, can be kept separate. The potting area is designed to accommodate paper sleeves or plastic pots, designed to customer specifications."

Kunde reports other service improvements including "new offices completely networked with new computers and customized software capable to handle bar code inventries on all cuttings and vines. A new phone system was installed, so that our locations in Santa Rosa, Fulton, Fresno, Caruthers, and Madera are totally linked. When customers call into any of these sites, we can now transfer the calls to any other company location, saving time and bringing all of Sonoma Grapevines together under 'one roof' statewide."

Sunridge Nurseries

Sunridge Nurseries, located in Bakersfield, CA, at the southern end of the San Joaquin Valley, farms 200 acres of certified rootstock and scionwood increase blocks and 440 acres of field-grown bench grafts and rootings. The nursery's growing, grafting, and storage facilities now total more than 300,000 sq.ft., including new, state-of-the-art greenhouses.

ENTAV-INRA® clonal selections were added to Sunridge's inventory this year. "This is brand new," says Craig Stoller, vice president. "For the first time, U.S. growers can have access to these authentic French materials."

There are 20 acres of ENTAV-INRA® certified French clonal material planted and growing, containing 36 winegrape selections and eight rootstocks. "These clones, now established in mother blocks, are not only guaranteed as to their authenticity but have been tested and found to be free of disease," adds Stoller.

Approximately 100 acres are being readied for more Franch clonal material presently being tested at FPMS.

Sunridge's licensing agreement with ENTAV-INRA® allows the nursery to sell to its customers, and the nursery may also sell to other nurseries that apply for and are granted approval from the French selection center.

Vinifera, Inc.

The Vinifera, Inc., grapevine nursery (Petaluma, CA) originated from parent company Agritope (Portland, OR). Vice president James Pratt points to three particular aspects of Vinifera which he feels distinguish his company from

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other nurseries: grafting technique, in-house disease testing, and custom propagation services.

Though traditional hardwood grafting is still about one-third of the company's production, Vinifera specializes in green grafting, also known as herbaceous grafting, which is practiced on young vines that have not yet completed a whole growing season. Green grafting provides a clean splice union and therefore smoothes the callusing process.

"Herbaceous grafting does have more challenges," concedes Pratt. "It's more expensive, labor intensive, perishable, and more sensitive in propagation than traditional grafting. The positive side, however, is that a green graft knits better, so there is less necrosis than with hardwood grafting. There is a more aggressive root system, and growth is more prolific the first year." Pratt also claims that herbaceous grafting is three times faster to market than hardwood grafting. Vinifera has developed its own herbaceous grafting machine, for which a patent is currently pending.

This year Vinifera has begun green-grafting versus wood-grafting testing with growers in different regions to test the variation in results achieved with the two methods. Pratt expects to begin collecting data in 1998, with a more comprehensive picture developing in about four years.

"Vinifera practices in-house disease testing," according to Pratt, "because, although private testing labs do a good job, we use a 'finer-meshed screen' and supply the reassurance of a double-check." Disease testing is repeated to ensure the accuracy of results and assure the customer that the vines are healthy.

If a vineyard manager brings a custom selection in from the field for testing and a virus is detected, Vinifera provides services to salvage such vine samples for clients. "The virus may express itself most visibly with new rootstocks. Vinifera can eliminate the virus through clean-up done at the tissue-culture level. The grower supplies the plant tissue and we make one bud cutting, from which plantlets are made for the customer."

"Once the customer's material has grown in our greenhouse, we perform ELISA testing (Enzyme Linked Immunosorbent Assay), as well as testing for leaf roll virus and for corky bark, which is a complex of viruses. This method of testing in plants is comparable to AIDS testing in humans. Testing green material has a higher degree of accuracy than testing dormant material. If the plantlet tests clean, we begin to increase and graft the green material."

Custom propagation is the result of such assays. "The nursery collects a tissue scraping sample and, instead of rooting it in a propagation growth chamber, grows it in an agar like Dolly the lamb" offers Pratt. "A new generation of virus-free tissue grown in agar results. Then the nursery can begin taking cuttings off the agar-grown medium plantlet. This allows us to rapidly increase stock and quickly supply grafted plants of virus-free material."

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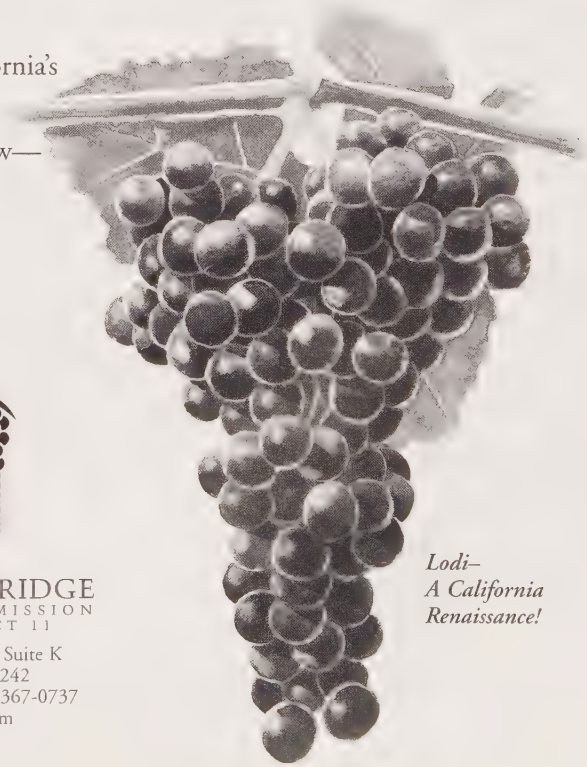

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Vintage Nurseries

After increasing Vintage Nurseries' Wasco, CA, greenhouse space by 155,000 sq.ft. in the spring of 1998, Jeff Sanders, general partner, reports that the next phase of expansion began in August 1998 for a new headquarters and operating facility. When completed, Vintage Nurseries will have grown to occupy 250,000 sq.ft. of greenhouse space, 40,000 sq.ft. of work space, and 9,000 sq.ft. of cold storage and 4,000 sq.ft. of office space.

Acreage at Vintage Nurseries includes 300 acres of rootstock increase blocks, 300 acres of scion vineyard (of which 200 acres are registered stock and the balance of which consists of new clonal material), and 300 acres of nursery rotation. The current company expansion will bring production capacity to 4 million potted bench grafts and approximately 7.5 million dormant vines per year.

"The new facility will be located on the same site as the nursery rotation area," explains Sanders. "The site spans 320 acres, 300 of which are intended for nursery rotation. The remaining 20 acres are reserved for the office, the grafting and operating facility, cold storage, and the greenhouse facility."

Conclusion

Continued growth of the U.S. wine industry bodes well for grapevine nurseries, which are growing and selling more vines than ever. Many nurseries are expanding their businesses to accommodate the surge in demand due both to start-up vineyards and replacement of disease-tainted plants.

What goes up must eventually come down, and the surplus of grapes from the 1997 harvest means the market is leveling off as demands are increasingly being met. Nurseries are searching for ways to distinguish themselves by adding new facilities, incorporating new technologies for disease resistance, and equipping themselves to produce better quality vines. Ultimately, nursery owners agree that this translates to improved selection, availability, and service conditions for their varying vineyard customer needs. ■

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Compost and Mulch

Continued from page 32

study at Mondavi found that blocks with compost applied had increased yields of up to 0.9 tons per acre, while the fruit quality remained the same. Application rates for the study ranged from two to eight tons per acre with the 0.9 tons per acre increase in yield occurring in the eight-tons-per-acre treatment.

Cost of the compost at $24 per ton applied at Tokolon was recovered by an increased yield valued at $1,350 per acre. Since the trial ended in 1995, about four tons per acre of compost has been applied annually to 20 acres in Mondavi's Tokolon vineyard.

In addition to annual applications, Skinner also promotes the use of compost to prepare land for new vineyard plantings. "I typically recommend a pre-plant compost application of five to 20 tons per acre, depending on the results of our "*Terrior*" soil analysis program. Compost is a good source of trace elements and enhances soil structure," says Skinner.

Pestoni is in a unique position because, in addition to being a compost producer, he owns Rutherford Grove Winery. When asked what application rate he suggests for compost, Pestoni responds, "You have to know your soil. Work with a soil specialist and get a lab analysis. Then we can talk about application rate." Upper Valley Recycling does extensive lab analysis on its Harvest Compost and provides potential customers with the results upon request.

Mulch used for erosion control

While many vineyards use straw or cover crops for erosion control, mulch made from urban yard trimmings can be a cost-effective alternative. Mulch is usually used for erosion control, weed suppression, and water retention. Compost improves soil tilth, adds beneficial microorganisms, and may be used as a slow-release source of nutrients. Mulch consists of yard trimmings that are ground and then screened to a uniform particle size. Unlike compost, mulch does not undergo extensive processing to decompose the material and is, therefore, usually less expensive. It is generally applied as a top dressing and slowly decomposes over time.

UC Cooperative Extension advisor Ben Faber in Ventura County has been conducting a demonstration study to examine the effectiveness of mulch and cover crops for erosion control in lemon orchards. "Preliminary results indicate that both mulch and cover crops are effective as weed suppression and erosion control methods," reports Faber. As vineyards continue to expand onto hillsides, mulch is a feasible tool for erosion control. Vineyard managers may want to experiment with a minimum mulch depth of three inches; if applied at a six-inch depth, the material will likely last for at least two seasons.

Mulch and/or compost effective for vineyard weed control

Clyde Elmore, a UC Cooperative Extension weed advisor, recently spoke at Foothill Grape Day in the Placerville area regarding vineyard floor management. Although he focused on herbicides, Elmore also discussed his research on the use of mulch for weed control. From his trials, Elmore concluded, "Greenwaste wood chips give good weed control. The mulch was persistent in the field and should give long-term weed-control benefits. Because it may last for more than one season, the short-term direct cost is not the best way to evaluate this product." However, many perennial weeds such as field bindweed are not controlled well with organic mulches. Depending on the coarseness of the mulch, two to six inches of material is needed to control most annual weeds.

At Pina Vineyard Management, White applies compost for weed control in his vineyards. He is perfecting a vine row applicator with the hopes to suppress weeds with compost application right next to the vines. "We find this is the most effective way of applying the compost. The chute will deposit the compost right where we want it and give us a more concentrated application than broadscale spreading."

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Know what you're getting

Asking questions of compost and mulch producers and reviewing lab analysis results are the only ways to learn exactly what you're getting. Common ingredients, or feedstocks, for compost and mulch include yard trimmings (collected at city curbs or transported directly from landscapers), manure, and in grapegrowing regions, grape pomace. Any reputable producer will disclose its feedstock. Producers registered with the California Compost Quality Council (CCQC) are required to disclose feedstock, pH, and a number of other product characteristics.

All large-scale producers of compost are subject to composting regulations promulgated by the California Integrated Waste Management Board. Depending on their composting method, these producers are required to maintain the compost pile at a temperature of at least 131°F for a specified number of days. This "time and temperature" process kills pathogens and weed seeds. In addition, regulated producers must test their end product to ensure that certain heavy metals and pathogens are within acceptable limits.

Producers of mulch, which is ground wood chips made from orchard or tree prunings or yard trimmings, are not subject to the regulations and thus are not required to put the material through the "time and temperature" process. However, some producers will subject the material to this process for a minimum time to kill pathogens and weed seeds, but not long enough to fully decompose the material.

Most producers also obtain product analysis which shows NPK, pH, and other characteristics of interest to growers. Martin Mileck of Cold Creek Compost (Ukiah, CA) sells compost to vineyards as a diverse source of nutrients. "I estimate there's about $60 worth of nutrients in one ton of our compost and it sells for $28 per ton (fob Ukiah, CA), a fraction of that cost," says Mileck. While nitrogen content of compost varies, depending on the feedstock, Mileck's product typically has between 1.5% to 2% nitrogen. Mileck also cites the high potash content (about 2.5%) of his product, which results from the addition of wood ash. Wood ash can also be a good source of other micronutrients.

If producers don't have what you want, ask if they can get it or make it. Material can be screened to specific particle size, small or large. In addition, many producers will make custom blend products upon request. Norm DeLeuze of ZD Wines in Napa Valley wanted a compost higher in nitrogen than the yard-trimming compost normally produced by his supplier for his vineyard in the Carneros district.

Greg Kelly of Napa Garbage Company responded to DeLeuze's needs by adding manure to the feedstock, increasing the nitrogen from 1.59% to 2.19% and increasing the phosphorus from 0.29% to 1.4%, producing a more balanced, higher quality compost. DeLeuze was satisfied, and Kelly is now selling the new product to other grapegrowers in the area.

To locate a supplier near you in California, call the Waste Board at 916/255-2410 to request the "Compost and Mulch Source List." The list is also available on the board's website at: http://www.ciwmb.ca.gov/organics/farming.

Making your own compost

A number of wineries compost their own pomace which solves a waste management issue and produces a valuable end-product. While some wineries use pomace as the only feedstock, a higher-quality compost may result from adding other feedstocks to the mix of organic materials.Yard trimmings, old animal bedding, and manure are good additions to pomace. These additional feedstocks serve as bulking agents and may help to buffer the pH of the pile. Another option to raise soil pH is to add lime.

Those who make their own compost should be familiar with properly using the basic "turned-windrow" technique. The most common composting problem is failure to turn the windrow (pile) frequently. This causes the pile to become anaerobic and encourages undesirable microorganisms and pro-

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duces unpleasant odors. The windrow should be kept about as moist as a rung-out damp sponge and turned regularly. The more frequently the pile is turned, the faster the compost will decompose. However, less frequent turning saves labor and energy.

"To obtain sufficient pathogen reduction and to kill weed seeds, a minimum of three turnings is required in the 1-2-3 turnover method," advises Bakx, who developed the method. Allow five days or more between turnings. Depending on the composition of the material and the particle size, three turnings will result in compost in five to eight months. Turning six to eight times will produce a finished compost in three to five months.

It's helpful to obtain a compost thermometer and monitor the internal temperature of the pile. The pile should be between 131°F and 150°F for at least 15 days. If the pile exceeds 155°F, turn the pile to dissipate the heat; adding additional water may result in even higher temperatures. Preventing the pile from reaching 160°F helps maintain the desired beneficial microbes and also helps prevent spontaneous combustion from occurring.

While the Waste Board encourages on-farm composting, current composting regulations may govern agricultural composting in certain situations. On-farm composters who use only agricultural commodities (*e.g.*, grape pomace) as feedstock are not subject to regulatory oversight if they sell or give away no more than 2,500 cubic yards of compost annually. If they are mixing non-agricultural source material such as yard trimmings with pomace, on-farm composters may be subject to nominal requirements.

Check with your local enforcement agency (LEA), usually the county environmental health department, for clarification on any requirements before composting any non-agricultural source materials. LEAs are posted by county along with regulations on the Waste Board's Web site at www.ciwmb.ca.gov/organics/farming. Look for California Code of Regulations, Title 14, Chapter 3.1. California growers seriously considering on-farm composting may contact this author for more information and request a copy of the *On-Farm Composting Handbook.*

A beneficial practice to consider

If your vineyard could benefit from improved soil structure, added beneficial microbes, improved moisture retention, and better erosion control, consider making or purchasing compost and mulch. Compost and mulch can be important long-term investments in the health of your vineyard. ■

Christy Porter promotes the use of compost and mulch in agriculture for the California Integrated Waste Management Board. She specializes in the area of compost use in vineyards and can be reached in her Sacramento office at tel: 916/255-2410 or by e-mail at cporter@ciwmb.ca.gov.

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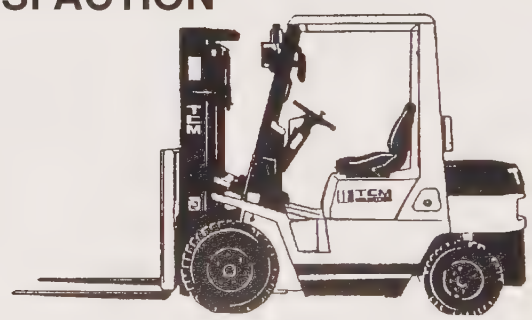

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Continued from page 47
bands of light. These bands can be either visible or not visible to the naked eye (red, green, and blue bands are visible, and near infrared is not visible.) The different bands can be combined to show the presence of chlorophyll and moisture in vegetation. For instance one combination of bands, familiar as infrared imagery, can show vigorous vegetation as bright red in the imagery.

Additional image analysis, such as an NDVI (normalized difference vegetation index) helps compensate for changing illumination conditions, surface slope, aspect, and other extraneous features, to give a more refined picture of vineyard health.

Multi-spectral imagery has been shown effective in detecting vigor or stress in vegetation. Camera expects to use multi-spectral aerial or satellite imagery to help assess plant health, especially as spatial control is established throughout his project. This spatial control will allow him to compare one year's multi-spectral imagery with next year's imagery to get a picture of subtle changes in vine health over time.

The website for more information on the GRAPES project is: http://geo.arc.nasa.gov/sge/jskiles/fliers/all_flier_prose/GRAPES_armstrong/GRAPES_armstrong.html.

Additional benefits of a GIS

At the Hess Collection, one major goal is to incorporate information currently held by various consultants and other external sources into the GIS. For example, CAD (computer-aided design) files depicting irrigation layout diagrams and other vineyard design elements from engineers, easement maps locating natural gas and water pipelines, underground and overhead power lines from the local utilities and municipalities, erosion control plans, topographic maps, and soil data will all be in the GIS and instantly available to Camera.

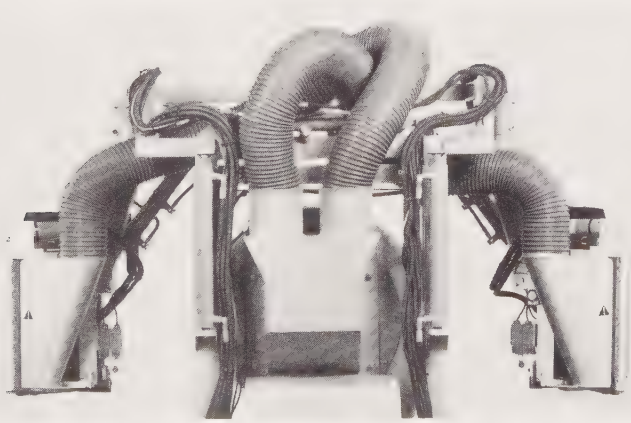
"One property we purchased recently came with its own CAD files that were created and compiled as part of the seller's development plans," notes Camera. "As part of our work with VESTRA, these CAD linework files were converted to GIS layers that include descriptive information, such as acres, length, or name, so the features are more information-rich for analysis beyond simple mapping. Now, I have plantable acres, restricted areas, a slope survey, soils maps, roads, fences, utilities, well sites, culverts, tree lines, buildings, and more. I wanted this data at my fingertips. We are at a time technologically where this can all be stored, manipulated, analyzed, and displayed in-house."

An additional benefit of a GIS is the ability to do spatial analysis, that might include a query selecting everything within 30 feet of a certain point or creating an avenue of 50 feet in a vineyard layout design. Within that queried space, spatial statistics are available quickly, such as how many acres you are removing from your plantable acres, if the spatial database is set up properly to give accurate information.

Vineyard design is a perfect exercise for a robust spatial database and sophisticated software. Camera will use VESTRA AgPlan software to anticipate vineyard development problems and resolve them. For example, by using a contour-derived digital elevation model, which describes topography, to overlay a proposed vineyard layout, he will be able to use a spatial query of the slope on the proposed layout to look at potential slope problems and then design vineyard blocks or row orientation to create a favorable layout. This process of testing and design adjustment can be run many times, until Camera is confident he has a successful design.

Conclusion

"The last thing that needs to be said about GIS," adds Camera, "is that it is fun and challenging, and very useful. It has given me a greater interest in the data that is generated and helped me think about our vineyards in new ways. Very few things have been as professionally stimulating to me as my involvement with GIS." ■



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by D.R. Storm, PhD. P.E.

AROMATHERAPY: SUBDUED BY A PINK CANDLE

Wastewater engineers have used aromatherapy of sorts for decades, however, it was given the simple label of odor control. Little did we know that, in addition to masking malodorous wastewater emissions, we were also temporarily altering the mental, and emotional state of the downwind odor targets.

I wasn't quite ready for my first lesson in the passive action of contrived essences, particularly in a public office setting. My first reaction was to wonder whether I had stumbled into the wrong office or interrupted a religious ceremony that somehow wasn't highlighted in my calendar. As I quickly learned, the staff in this particular office was experimenting with aromas that tend to be calming and relaxing.

The ultimate objective was to artificially create a relaxed environment for members of the general public who usually enter this administrative space with no confrontational mind-set. The beeswax candles, I was told, were infused with a mixture of lavender, lemon, and clary sage.

The integrated effect of the tiny flickering candle flames and the subtle aroma blend reminded me of the high desert country after a rain. I observed that the mood of the group in the office was definitely on the mellow side. (A future column on indoor air quality will describe the special care that individuals must take when wearing perfume, shaving lotion, or cologne in this era of workplace sensitivity.)

Researching this subject further, I discovered that the mode of aroma substance delivery could be tailored to: massage, warm compresses, steam inhalation, vaporizer, bath, tea, food, and spray.

For more information on this intriguing subject contact:

Starwest Botanicals, Inc., 11253 Trade Center Dr., Rancho Cordova, CA 95742 *or* Arome de Provence, PO Box 1346, Solvang, CA 93464.

Slime in your potable water pipes: Yuck!

With contemporary opinions among public health practitioners divided on the subject of whether chlorine or ozone disinfection is preferred, the problem and possibilities of pathogen growth within potable (drinking) water systems is receiving greater attention than it has in the previous decade.

Chlorination, while not a "perfect" disinfectant, has prevented waterborne disease outbreaks from decimating large numbers of the world's population. What has made chlorine a most effective pathogen killer for the last 80 years is its ability — because of the chlorine residual — to provide a continuing safety factor which maintains a nearly sterile water supply. Every day, the problem of properly maintaining this residual faces waterworks officials (in large municipal systems) or facility managers in systems associated with wineries or other utility-self-sufficient industries and commercial activities.

Chlorinating water supplies that contain concentrations of organic solids can produce so-called halogenated organics. Such compounds are classified as carcinogenic, and this is the downside of chlorination.

Ozone, on the other hand, is an extremely powerful oxidizer and produces pathogen destruction in the order of 99.99%, when it is introduced in the proper concentration with the correct contact time (between water and ozone mixture). The downside of ozone use is that there is no residual effect to prevent regrowth of pathogens or other nuisance organisms (such as iron bacteria and biological slimes). One of the frequent sites of organism regrowth is the interior pipe walls of water distribution systems.

Wineries that elect to use ozone disinfection will need to put systems in place to prevent and detect recontamination or regrowth of pathogens.

Hydraulics and organism regrowth kinetics

During certain phases of the wine production cycle, there will be less water use generally, than during harvest when water use demands are at their highest. If a winery has a multi-capacity pump system or a variable speed pump that responds to in-winery demand, the velocity of flow will vary from lows of 1.5 to 2.0 feet per second (fps) to highs of 3.5 to 4.0 fps.

During the periods of high water demand/high water velocity, slime layers attached to interior pipe walls may be scoured loose. Other potential bio-growth sites are in long pipe runs that deadend and are not "looped." Looping is done in well-conceived plumbing networks to provide continuous movement of water throughout the distribution system.

What are sources of the organisms?

Organisms can enter the potable water system under two circumstances. Distribution pipe repairs can permit entry of soil and other organisms while a pipe trench is open and the pipeline is incised to effect repairs and stop leakage. Conventional water storage tanks have a free water surface that is generally only protected by screened vents on the tank roof which are installed merely to prevent insect entry. Dust and other particulate, airborne detritus can enter through the vent and become a source of microbial contamination.

Once in the system, bacteria may pass through during use or find their way to portions of the piping system (low flows and deadends), where the very attractive bio-coating on the pipe wall can become a substrate for colonization and eventual microbe multiplication. The likelihood of pathogens (harmful bacteria and viruses) entering by means of these routes is remote but certainly possible.

Combating scum/slime problem

The probability of detecting the presence of these unwanted microbes through routine sampling and analysis is very low. Under any of the water sampling and testing protocols currently in use by public health agencies, none, in the author's experience, require the testing of pipe interiors for the presence of the coliform group of organisms.

In addition to having a repair crew thoroughly flush the system after a pipe repair; the method of decontaminating the system that would present the least cost and least disruption of winery production activity would be the periodic introduction of chlorine at the source end of the system with subsequent flushing to remove the destabilized slime layer. The disinfection protocol should be in accordance with American

Water Works Association specifications C 196-97. Needless to say, the chlorination and flushing operation would have to be performed at night or on a holiday when the winery was not operational.

Establishing the schedule for frequency of chlorination flushing processes can be based upon recommendations of the local public health practitioner or by installing a series of short, high-strength, clear, polyethylene pipe sections in valve boxes where the pipes can be inspected with a high intensity lamp for presence of a biofilm on the site glass wall. ■

David Storm is a consulting environmental and civil engineer, specializing in winery utility systems, owner of Winters Winery, Inc., and author of the reference textbook, Winery Utility Systems: Planning, Design & Operation.

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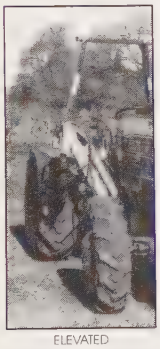
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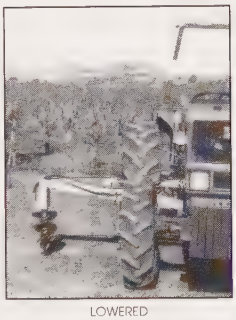
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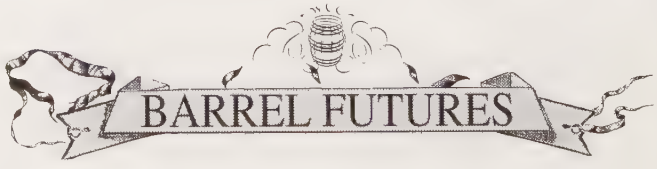

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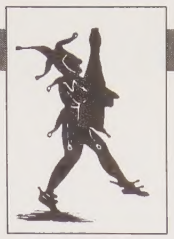

Bum's rush

"Listen, Jake. Can I call you Jake? Right, so like I'm telling you, we've got the whole deal. We're not playing around here."

Jake Lorenzo watches as the man spreads some drawings on the counter at Chuy's Burrito Palace. The man is dressed casually, if casual can cost thousands of dollars. Italian slacks, silk shirt, and Spanish leather shoes. The Rolex and the tasteful diamond pendant hanging from the gold chain like a ripe grape merely decorate the ensemble. "Money" is what it says, and the guy can talk. Boy, can he talk.

"Jake, look what I'm showing you here. These are the plans for the winery. We've already got the property. Well, actually we're in escrow, but it closes pretty soon. Beautiful. Just beautiful. You're gonna love it. High up in the hills overlooking Sonoma Valley. Some days you can sit up there in the bright sunshine looking down on the fog filling the valley like some gigantic cotton cloud that's flooded paradise.

"See the plans. The winery is modeled after Chateau Petrus. We're importing Italian marble for the floors. The windows will be stained glass representations of the grape harvest. Place will look like a damn church.

"Everything's state of the art. Nothing but the best. We got a crusher that's so gentle the grapes don't even know they're being squeezed. Our press cycles are programmed down to seconds to give the winemaker absolute control. We buy our yeast directly from Berlex labs, where they've cloned special yeast cultures to our specifications. No one else can use them, because we've paid for exclusivity. Believe me, it wasn't cheap, but in today's market you've got to be a step ahead. You know what I mean, Jake?"

"Know what he means, Jake?" asks Chuy, as he pours another Negro Modelo for me. Chuy makes a lewd masturbatory gesture directed toward the man who is bent over rummaging through a hand-tooled alligator brief case.

"Look at this," he says, extracting a tall, smoky-colored burgundy bottle. "This is the finest glass in the world, hand blown in Lucca, Italy. Same company that makes those crystal grappa bottles. We're not crapping around here, Jake. Everything is first rate. If it's not the best, then we're not interested.

"But it's not just smoke and mirrors here. We're not some rich group of dreamers who don't know what we're doing. It's not all marketing here. We aren't just building a showplace winery and using fancy bottles and decorating the package with a glorious label. By the way, did I tell you we've got Chuck House doing the label. He's the best in the business, but we're not using that Francophile, jokey style that Randall Grahm's got him into over at Bonny Doon. Hell no! We've got more class than that. Chuck's going to design the most elegant wine label that has ever graced a wine bottle. It will knock you out. The label alone will sell 10,000 cases.

"But like I was saying, it's not smoke and mirrors here. We're after quality. That's why we hire the best, most experienced people. Know who our consultant is going to be? Go ahead, take a guess. You'll

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never guess. Andre Tchelistcheff, that's who's going to be our consultant. Of course, we haven't actually signed him yet, but our people are talking with his people."

"Lot's of luck, Señor," laughs Chuy. "Tchelistcheff died years ago. I think that pretty much means he's retired."

"See, that's what I'm talking about," says the man, "we're not rookies here. We've got back up plans for whatever the contingency. We find out that Andre can't make the gig, we're ready. We probably should go with someone younger anyway. That's why we're talking with Helen Turley. You don't come any hotter than that. She could make wine out of stones."

Jake Lorenzo is not amused. He thinks to himself, "I could be doing something important like playing hearts on the computer. I don't need to listen to any more of this crap." Trying to be polite, Jake says, "Listen, I think you're really onto something here. Thanks for sharing this beautiful dream with me and Chuy. We wish you the best of luck. We really do, but I've got to be going."

"C'mon Jake. You can't kid a kidder. You're too shrewd for me. I know sometimes I go on too long, but I'm so pumped. I'm so into the vision of this thing, sometimes I can't help myself.

"Let's cut to the chase. You can see that we're serious. We're only interested in the best. When it comes to this detective business, the best is Jake Lorenzo. We're not crazy, Jake. We know it's not enough to have the best winery and the best equipment and the best consultants. There's more to it than that, man. We've got to get some grapes. I mean, you can't make wine unless you've got some grapes, right? That's where you come in Jake. We want to hire you to find the grapes. We want the best grapes in California. Price is no object. We don't care what the variety is, just so long as they are the best.

"And, Jake, I don't have to tell ya, time is of the essence here. I mean crush will probably start in a week or two. We can't have this great winery without the grapes. So we came to the man. Jake Lorenzo, the best in the business. We'll pay your fee. We'll cover all expenses. We'll give you a bonus."

He holds out his hand. "What do you say, Jake? Are you with us, pal?"

Jake Lorenzo rises from the stool gracefully. He grasps the outstretched hand and, with lightning speed, twists it behind the man's back. Using the arm like a rudder, Jake propels the man straight through the Burrito Palace and out the door. The bewildered man stands outside the restaurant as Chuy hands him the hand-tooled alligator briefcase with the hand-blown Italian bottle and the expensive drawings.

"Sorry Señor, Jake says he don't share your dream. For him, it's sort of a nightmare. Comprende amigo?"

Chuy walks back into the Burrito Palace. Jake is sitting at the counter sipping on the bottle of El Tesoro Añejo. Chuy pats his friend on the back. "Where the hell do these people come from," asks Chuy. "That's the third one this week."

"I don't know," answers Jake. "But I think I know how the Indians felt when the settlers made their push. There's more of them than there are of us." Jake glares into his glass as he pours more tequila. "One thing for sure, those bastards ain't putting me on no reservation." ■

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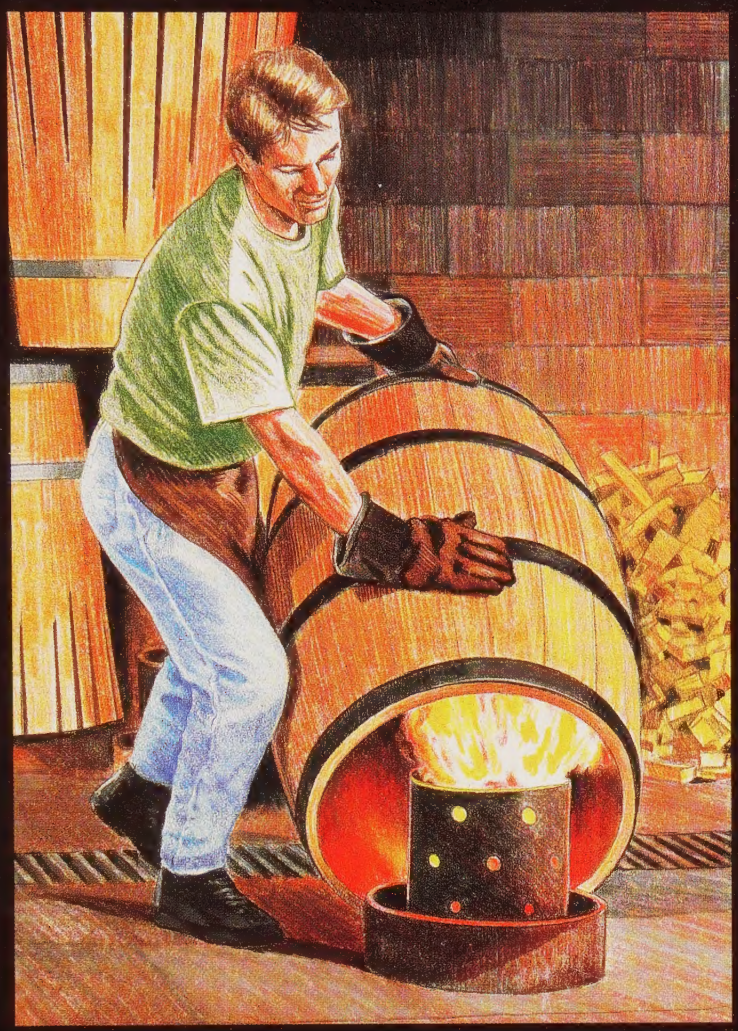
One Barrel at a Time



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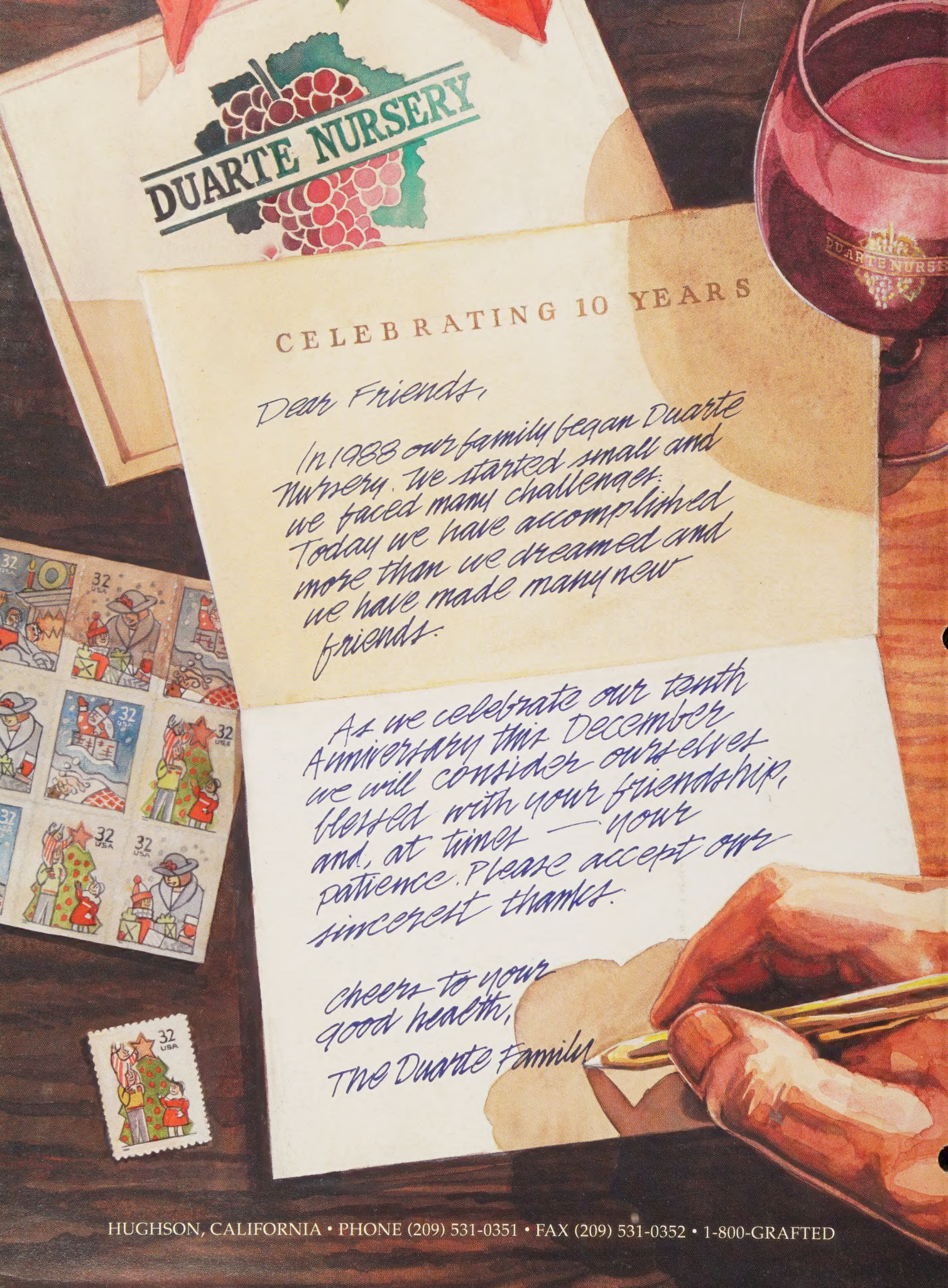
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